DOCUMENT RESUME

ED 282 108 CE 047 384

TITLE	Idaho Safety Manual.
INSTITUTION	Idaho State Dept. of Education, Boise. Div. of Vocational Education.
PUB DATE	Sep 86
NOTE	246p.
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE	MF01/PC10 Plus Postage.
DESCRIPTORS	Accident Prevention; Check Lists; Compliance (Legal); *Course Content; Definitions; Educational Resources; Injuries; *Laboratory Safety; *Safety Education; *Safety Equipment; *School Safety; Secondary Education; State Curriculum Guides; State Programs; Statewide Planning; Teaching Methods; *Vocational Education
IDENTIFIERS	*Idaho

ABSTRACT

This manual is intended to help teachers, administrators, and local school boards develop and institute effective safety education as a part of all vocational instruction in the public schools of Idaho. This guide is organized in 13 sections that cover the following topics: introduction to safety education, legislation, levels of responsibility, liability, general safety rules, specific safety practices for using various equipment, safety check list, forms and accident reporting, posters, safety specifications for facilities, fire protection, protective gear, and specific vocational program safety information (for the program areas of home economics, business, and marketing). Appendixes to the guide provide a glossary of terms and a directory of safety resources. (KC)

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IDAHO SAFETY MANUAL

IDAHO DIVISION OF VOCATIONAL EDUCATION

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September, 1987

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ACKNOWLEDGEMENTS

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1.0 INTRODUCTION

Effective safety education leads to attitudes and consciousness that result in safe work practices and prevent accidents within the vocational program. In addition, effective safety education is one step in the right direction toward protecting the student, the instructor, and the local school board against liability in the classroom and laboratory.

The task of overcoming the "it can't happen to me" attitude is a big one and requires that safety awareness be an integral part of the everyday instructional program. This manual is intended to serve in helping teachers, administrators, and local school boards develop and institute effective safety education as a part of all vocational instruction in the public schools of Idaho.

An effective safety program centers around several key considerations. These include:

1. Development of acceptable attitudes and desirable safe behavior patterns among students.
2. Provisions for safety instruction in all activities conducted in the vocational lab or classroom.
3. Supervision of students at all times in the vocational laboratory.
4. Documentation of safety instruction and student attendance at the time of instruction.

This manual is intended to alert vocational teachers, local supervisors, school administrators, and local school boards to the importance of a strong safety program. It is also intended to provide the instructional resources for instituting safety instruction in the public schools, for the inservice training of vocational instructors, and for the education of undergraduates in teacher education programs of Idaho.

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2.0 LEGISLATION

  2.1 Legislation

2.1 LEGISLATION

By their very nature, vocational courses mandate a concerted effort by everyone involved to see that safety is stressed and practiced in the classroom, as well as the laboratory. They are in the unique position of influencing the development of safe and successful work habits that are required in industry.

A growing concern in the nation for the safety and health of its citizens was enacted into law with the passage of the Occupational Safety and Health Act of 1970, by the U.S. Congress (OSHA). The Act became law on April 23, 1971, and is designed specifically to eliminate unsafe working conditions in all areas of employment. It is intended as a guide to the states in setting up occupational safety and health programs which conform to regulations established in the 1970 Act.

In Idaho, the Idaho Occupational and Safety Health Standards Code No. 1 was adopted by the Industrial commission on January 17, 1974. This authority under Idaho Code 11-A General Provisions gives the authority to the Industrial commission to adopt regulations as minimum safety and health standards applicable to places of employment maintained by the State of Idaho and its political subdivisions subject to the Idaho Workmen's Compensation Law. Sections 72-508 and 72-720, Idaho Code. These regulations and minimum safety standards are applicable to all public schools in Idaho.

The Idaho Safety Code No. 1 was revised and replaced with an amended version and adopted on April 17, 1983. This Idaho Safety Code 1, General Safety and Health Standards, IDAPA 17.3 is used as the guide for enforcement of the Standards.

In these regulations students are not considered employees, except in those cooperative education classes where they are receiving pay. However, technically, educational facilities are subject to regulations due to the presence of teachers (employees) and therefore it is desirable that the Safety and Health Standards apply to schools equally with other agencies, and that they be taught and practiced by students. Inspectors from the Industrial commission may visit school facilities including shops and laboratories to review safety and health applications and give counsel on meeting state and federal safety and health standards.

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3.1 RESPONSIBILITY

Ultimate responsibility for safety instruction rests with the board of trustees of each school district. (33-512, Idaho Code) In practice, however, this task is shared with others who are in leadership positions: students, parents, teachers, school administrators, the State Board of Education, and the State legislature. Each has a role to play which should result in providing the environment and the means to develop acceptable attitudes and desirable safe behavioral patterns in students.

It is important to note that the outlined responsibilities are not exclusively derived from law. Because of Idaho's minimum legislative intervention approach, there are few laws that specifically apply to vocational education safety. However, there are a large number of desirable practices and national consensus standards that apply to practical arts and vocational education because they represent the "safe way of doing things".

3.2 STATE LEGISLATURE

The Idaho State Legislature has the responsibility to pass laws and establish government to protect the health and welfare of its residents.

3.3 STATE BOARD OF EDUCATION

The State Board of Education mandates that public school systems establish and maintain viable safety and health programs that meet the needs of those who participate in the educational program. This includes students as well as employees. The local school district will provide an environment that is free from preventable hazards that may affect those who participate within the system.

3.4 STATE BOARD FOR VOCATIONAL EDUCATION

The State Board of Education sits also the State Board for Vocational Education.

3.5 STATE DIVISION OF VOCATIONAL EDUCATION

The State Division of Vocational Education's primary role in safety and health is extending leadership assistance to the local education agencies in the areas of personal and environmental safety, health management and curriculum services in vocational programs.

3.6 THE LOCAL SCHOOL BOARD

The responsibility for providing a safe laboratory or vocational facility rests with the Local School Board or Local Education Agency (LEA). (Idaho Code 33-512): - To protect the morals and health of the pupils). The LEA controls budget, curriculum and personnel policy to a major degree. Without district level support, safety program effectiveness will at best be spotty, carried out by dedicated personnel and ignored by others.

The success of a safety program is dependent to a great extent on the environment in which students work and learn. The development of policy concerning safety not covered by law or regulation also rests with the LEA. In addition, the LEA must provide specialized safety equipment such as eye protection devices, gloves, aprons and extinguishers and provide adequate ventilation for harmful dust and fumes. State law authorizes the LEA to purchase insurance for protection against tort claims should an accident occur. The Local School Board has the responsibility to:

1. Inform staff and administration of their legal obligations in regard to student injuries and the liability of teachers.
2. Adopt policies and procedures prepared in cooperation with administration, staff and appropriate agencies which provide the basis for the development and enforcement of a safety and health program.
3. Provide liability insurance and legal services for employees to the extent allowed by the state statute.
4. Provide sufficient funds for an efficient facility, safe equipment, proper materials and instructional personnel to carry out an effective safety and health program.
5. Establish a district safety committee and involve this committee in the safety and health program in an advisory capacity.

3.6.1 RESPONSIBILITY OF THE LOCAL ADMINISTRATION

The authority delegated by the Local School Board of Education to the school administrator is that of assuring that vocational programs have sufficient facilities, tools and equipment needed for the teacher to implement an ongoing safety program. The administrative role should include assuming primary responsibility for planning safety programs, requiring surveys, organizing safety

instruction for staff, enforcing safety practices, correcting hazards, promoting desirable attitudes toward accident prevention, obtaining professional assistance when needed, assuming responsibility for injury, providing adequate and safe facilities, maintaining staff interest in safety efforts and providing inservice safety workshops.

3.6.2 POLICY STATEMENT ON SAFETY

A suggested safety education policy statement is provided below:

IT IS THE POLICY OF THE SCHOOL BOARD THAT AN EFFECTIVE VOCATIONAL SAFETY EDUCATION PROGRAM BE CONDUCTED THROUGHOUT THE SCHOOL SYSTEM, WITH ITS PRIME OBJECTIVE BEING ACCIDENT PREVENTION IN THE SCHOOL, AT WORK, AND AT HOME. IN FURTHER SUPPORT OF THIS POLICY, THE SCHOOL BOARD ADOPTS THE PROVISIONS OF THE IDAHO VOCATIONAL EDUCATION SAFETY MANUAL FOR INSTRUCTION AT ALL LEVELS.

The implementation of this policy will make young people and adults more aware of the dangers that exist about them in today's industrial world and of the need for attitudes and habits that will ensure safe living and conservation of human resources.

3.7 RESPONSIBILITY OF THE ADMINISTRATOR

Administrators are accountable for identifying a system for evaluating effectiveness of safety instruction, avenues for reporting deficiencies in equipment and facilities and supervision of safety instruction. Administrator also should assure the means for correcting unsafe equipment or conditions.

Each school district is organized somewhat differently because of size, location or other local factors. For these reasons, the assignment or responsibilities for safety programs will differ from district to district.

Recognizing these local differences, the following general administrative responsibilities are listed, but not assigned to a specific administrator. (e.g. Superintendent, Principal, Vocational Director, or Safety Officer):

1. Adopt a safety policy.

2. Make personnel assignments for specific aspects of the safety program.
3. Provide budget figures necessary for the operation of the safety program.
4. Keep records on safety.
5. Provide inservice programs for staff awareness and training.
6. Inspect, monitor and report.
7. Plan corrective actions and follow through where necessary.
8. Provide enforcement of accepted practices.
9. Review curriculum for the inclusion of safety instruction.
10. Communicate information about the safety program to all appropriate audiences and provide for public relations concerning the safety program.
11. Provide the proper supervision of students at all times.
12. Arrange first-aid training for vocational instructors.

3.8 RESPONSIBILITY OF THE TEACHER

The responsibility of the teacher is to discharge the duties assigned within the scope of their employment. The teacher's role should be defined by district policies established by the local school board.

The major responsibility for safety instruction in accident prevention fall upon the teacher. (Idaho Code 33-1208: - Gross neglect of duty is grounds for Revocation, suspension and denial of teaching certificate).

When accepting employment in a school district, a teacher accepts the obligation to assure that a safe working environment and safety instruction and student evaluation will be integral parts of the instructional program. Furthermore, a teacher accepts a professional obligation to safeguard and educate those who have been placed in their trust. The teacher should utilize various teaching methods and safety resources available as well as incorporate safety as a regular part of instruction.

The following are considered the responsibilities of the teacher in a comprehensive accident prevention program in school laboratories and shops.

1. Incorporate safety instruction in the course of study and maintain documentation about who received instruction and when the instruction was given.
2. Present instruction on potential hazards and accident regulations relating to school facilities and provide for an appropriate and safe environment.
3. Instigate comprehensive safety practices, rules, and regulations relating to school facilities and provide for enforcement.
4. Develop specific safe practices, rules, and regulations relating to the facilities and provide for enforcement. (Idaho Code 33-1224: - Power and duties of teachers).
5. Keep informed of new and accepted safe practices for accident prevention.
6. Provide proper instruction in the use of all tools, machines and equipment. Keep a record of each student's attendance, safety training, and safety evaluation.
7. Require that a student be enrolled in the vocational program and successfully demonstrate the required safety instruction prior to working in the training station.
8. Set a proper safety example for students to follow.
9. Insist that adequate eye protection be worn in all vocational laboratories and shops at all times by the instructor, all visitors and students.
10. Insist on proper protective equipment in all laboratories and require students to wear proper clothing and adequate hair guards while working in these areas.
11. Devise and enforce safe housekeeping procedures.
12. Insist that guards meeting accepted standards be provided and used whenever a machine is operated.

13. Establish and maintain the safest possible working environment.

14. Establish pre-planned procedures in case of an accident or emergency.

15. Provide prompt and thorough reports of all accidents including:

    a. Written report by instructor.
    b. Written accounts by witnesses.
    c. Photographs of accident scene and conditions.

16. Provide for the supervision of students in the classroom or laboratory in accordance with legal requirements.

    NOTE: DON'T LEAVE THE CLASSROOM UNSUPERVISED AT ANY TIME WHEN STUDENTS ARE PRESENT.

17. Be aware of the specific safety needs of special needs students (disadvantaged and handicapped); such as, color-blind, contacts, etc.).

18. Review laboratory facilities regularly to maintain safe conditions. Give special attention to:

    a. Layout of equipment and furniture
    b. Utilities and building services
    c. Equipment guards and safety features
    d. Storage and condition of tools
    e. Storage, labeling, condition and handling of materials

19. Make recommendations to administrator for improving safety conditions.

20. Carry out recommendations of the administrator for improving safety instruction.

21. Help determine a safe class size.

22. Incorporate safety instruction, (the proper use of all tools, machines, equipment and materials) in the formal course of study.

23. Ensure that all course activities are in the school's approved course of study.

24. Retest students periodically to ensure maintenance/ retention of specific safety competencies.

25. Participate in safety training programs, such as first aid, civil defense, industry and business training sessions (SME, ASSE, AIHA, ATENA, etc.) and other relevant safety courses.

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4.0 LIABILITY

4.1 Teacher Liability

4.1 TEACHER LIABILITY

Regardless of the time and care that teachers take to insure that accidents will not happen, the possibility of injury to students in vocational education classes still exists. When a school related accident results in an injury, these questions then arise:

1. What caused it?
2. Who was to blame?
3. Could it have been prevented?
4. Who is responsible for any necessary medical attention and/or hospitalization costs?
5. To what degree has the teacher been negligent?

The possibility of having liability established, therefore, has become of great concern to vocational education teachers. Just as it has to other professionals who render service, such as the doctor, the architect, and the engineer--where negligence may be established in relation to professional service.

Negligence may be an act of either omission or commission. Ordinarily the courts measure the question of negligence on the nature of the conduct of the teacher, the proximate cause of the injury and the foreseeability of the possible injury to the pupil.

Each question of negligence must turn on the facts of each situation. Generalizations are of little practical value. The following statements relate to negligence:

1. The act is not properly performed; the teacher does not employ appropriate care.
2. The circumstances under which the act is performed create risks although the act is performed with due care and precaution.
3. The teacher performs acts which involve an unreasonable risk and may cause direct and immediate harm to students.
4. The teacher sets in motion a force, the continuous operation of which may be unreasonably hazardous to students.

5. The teacher created a situation which is unreasonably dangerous to pupils because of the likelihood of the action of third persons or of inanimate forces.
6. The teacher entrusts dangerous devices or instrumentalities to pupils who are not competent to use or care for such instruments properly.
7. The teacher neglects a duty of control over students who by reason of some incapacity or abnormality are likely to inflict intended harm.
8. The teacher fails to employ due care to give adequate warning.
9. The teacher fails to exercise the proper care in looking out for students believed to be in the danger zone.
10. The teacher fails to employ appropriate skill to perform acts undertaken.
11. The teacher fails to make adequate preparation to avoid harm to students before entering in certain conduct where such preparation is reasonably necessary.
12. The teacher fails to inspect and repair instruments or mechanical devices used by students.
13. The teacher's conduct prevents a third person, such as another teacher, from assisting pupils imperiled through no fault of the teacher.

It should be obvious from the foregoing that it is necessary to teach safety in a complete and thorough manner to every student in a class. Also, it is the responsibility of the teacher to detect physical conditions which might cause accidents. It is most essential that vocational education teachers take immediate action to correct noted conditions that are considered hazardous or to report them to the person in authority. Failure on the part of a teacher (1) to teach safety to every student in their classes or (2) to detect or anticipate hazardous conditions might result in the teacher being held liable for negligence if an injury did occur.

The doctrine in loco parentis provides a base for determining if a vocational education teacher is to be found negligent through litigation. Essentially, it means that a teacher is expected to exercise the same care in dealing with a pupil that would be provided by a prudent parent. Since several cases have awarded judgments to parents on the basis of this doctrine, vocational education teachers should observe these minimal precautions:

1. When students are doing manipulative work in class, a qualified teacher must be present at all times.
2. Students may not use power machines that have not been authorized to implement the course of study. If a student were injured while using a power machine provided by a teacher, an individual, or a company in community, which had not been authorized by the school system for instructional purposes or which failed to meet safety specifications, the teacher would be placed in an untenable position.
3. Students may work in shops or work stations during unscheduled periods only when a qualified teacher is present.
4. Only qualified students may use power machines.
5. Students not formally enrolled in a vocational education course should be expected to meet the same requirements as those enrolled in a class.
6. Teachers need a reporting system that will keep a record of all students who have accidents. Students who are accident-prone can be identified and problems corrected.
7. Consideration needs to be given to limitations to be imposed on students with mental and physical handicaps, in respect to the operation of power equipment.
8. Students should undertake maintenance or other work outside a laboratory only when such experience is essential and is specified in writing as an integral phase of a course of study.
9. Students must not be allowed to make any modifications to specialized equipment or machines except under the direct supervision of the teacher and with written instructions from the manufacturer.
10. Written records need to be kept for:
    a. All injuries
    b. Safety tests passed

c. Safety precautions stressed as an integral part of instruction
d. Safety pledges signed by students

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5.0 GENERAL SAFETY RULES

On the following pages are general safety rules for the various areas found in vocational education and industry. If necessary, changes and additions should be made by the instructor in order to meet the needs of the particular situations.

Since safety must be sold to students and workers, the most effective sales techniques available to the instructor or supervisor should be used. It is further suggested that the following safety rules be photocopied and given to individual students to keep for reference.

5.1 GENERAL SAFETY RULES FOR VOCATIONAL EDUCATION AREAS

1. Secure approval from the instructor for all work planned.
2. Report all injuries to the instructor, regardless of how slight they might be.
3. Wear proper eye protection as required by Idaho Law.
4. Absolutely no horseplay or running is allowed in the shop or laboratory area.
5. Wear appropriate clothing; it should not be loose fitting. Roll up sleeves, take off ties, remove jewelry, watches, necklaces and rings.
6. Wear protective clothing, aprons, gloves, or shop coats. Launder them periodically or when needed.
7. Keep hair away from moving parts. Extremely long hair can be a danger and may need to be secured appropriately for the student's safety.
8. Use traffic zones staying clear of dangerous areas and machines.
9. Be careful of handling and storing material. Get help when needed.
10. Keep work stations and equipment clean.
11. Report to the instructor any machines or tools that do not function properly or show need of maintenance.

12. Be alert in making others aware of safety hazards and improper procedures.
13. Do not allow chips, scraps and other litter to accumulate on the floor.
14. Wipe up all spilled liquids immediately to help prevent falls.
15. Keep cabinet doors and drawers closed when not in use.
16. Place oily rags and other combustible material in metal containers that are fire proof.
17. Know procedures to follow in case of fire or accidents.
18. Operate tools and machines only after appropriate instruction and a complete understanding of their operation and safety procedures.
19. Develop a receptive attitude towards safety.
20. Understand all instructions and rules and follow them.

5.2 GENERAL SAFETY RULE FOR PERSONNEL

5.2.1. HEAD

1. Confine long hair to reduce risk of injury from hair entanglement in moving parts of machinery.
2. Wear a hard hat when and where appropriate.

5.2.2. EYE/FACE

1. Wear appropriate safety goggles, glasses or face shield when there is danger of eye injury from flying chips or liquids or if there is a need to reduce glare.

5.2.3. RESPIRATORY

1. Wear proper respirators and filters where harmful dusts or fumes exist. Safety instruction should fit testing.
2. Provide adequate ventilation for dusts, fumes, and vapors.

5.2.4 BODY PROTECTION

1. Do not wear loose clothing in the laboratory or on the job. It constitutes a safety hazard.
2. Remove rings and other jewelry while working in the laboratory or on the job if it constitutes a safety hazard.
3. Wear proper leggings and foot protection, gloves, aprons, and shields when working with molten material.
4. Make certain that the appropriate protective clothing is used when handling harsh materials that would cause chemical burns or lacerations.

5.2.5 HEARING

1. Where noise levels are excessive over long periods of time, ear protection must be worn.
2. Engineering solutions should be sought out to remedy excessive noise problems.

5.2.6 PERSONNEL PROTECTION CAUTIONS

1. Determine the physical limitations of all students and employees. Do not assign tasks beyond capabilities of students.
2. Don't use asbestos material. Use an alternative protective fabric.

5.3 GENERAL SAFETY RULES FOR LIFTING AND HANDLING MATERIAL

1. A show of strength can lead to injury. Get help or use a lifting device. Do not risk back and abdominal injuries.
2. Check footing before lifting. Feet should be placed firmly, not more than twelve inches apart, with the weight of the body directly over the soles of the feet. Keep arms and back straight and lift with the legs, not the back.
3. Long objects should be carried with the front end down. The preferred practice is to have a person on each end.
4. Be careful of splinters when handling lumber; wear gloves to handle rough stock.
5. Be careful not to drop or set heavy objects on feet.
6. Stack materials so there is no danger of slipping or falling during storage or removal.
7. Handle sheet metal with gloves and be careful of burrs on any metal edge.
8. Be extremely cautious of raising metal into a vertical position. It can easily come into contact with electrical wiring.
9. Use proper aids in handling equipment, such as tongs for hot materials, block and tackle or jacks to lift extra heavy items, and blocks or wedges to keep items from rolling.
10. Before picking up an object, make sure that the path is unobstructed.

5.4 GENERAL SAFETY RULES FOR HAND TOOLS

1. Select the proper size and type of tool for the job.
2. Make sure that cutting tools are properly sharpened and in good condition.
3. Keep hands free of oil and grease.
4. Handle sharp edged and pointed tools with care. Point edges away from yourself and other people while carrying and using.
5. Secure small or sharp work with a vise or clamp.
6. Never carry cutting tools in pockets.
7. Do not use tools for purposes other than for which they were intended.
8. Learn and follow the correct procedure for using each tool.
9. Wear eye protection as required by Idaho Law.
10. Do not use tools with loose or cracked handles.
11. Grind mushroomed heads off of chisels and punches.
12. Before completing a saw cut, slow down to avoid injury when the saw cuts through the material.
13. Use a file only when it is equipped with a handle.
14. Never pry with, hammer on, or hammer with a file; it will shatter.
15. Do not use screw drivers for chisels or pry bars.
16. Select wrenches that fit properly and always pull rather than push on them.
17. Do not use a hard hammer on another hardened surface or chipping will result.
18. When finished with a tool, clean it and return it to the proper storage place.

19. Report any breakage or malfunctions to instructor.

20. Stop machine before adjusting or lubricating.

21. Never "feel" the surface of a project while it is being machined.

22. Clean chips off with a brush, never with rags or hands.

23. Never allow anyone to stand near a machine which you are operating.

24. Files are brittle. Handle them with care, they can shatter in your hands.

25. Wear a face shield when grinding metals because of a danger of flying chips.

5.5 GENERAL SAFETY RULES FOR AUTO MECHANICS

1. Wear proper eye protection.
2. Do not use gasoline as a cleaner.
3. Be extremely careful when removing radiator caps to remove the possibilities of burns.
4. Never work on a clutch assembly without first disconnecting the battery; serious hand injuries can result.
5. Do not connect battery charger leads to a battery with the machine on; this can cause a battery explosion. Eye protection must be used when handling batteries.
6. When dismantling a front drive assembly, make sure the control arm is secure, it could unleash with a lethal blow.
7. Always block the tires when raising either end of a car.
8. Never discharge Freon 12 into an open flame or in the direction of any person. Serious injury can result.
9. Do not weld, cut, or solder on or near an air conditioning system; heat causes freon to expand. This may cause lines to rupture or a safety plug to blow.
10. When inflating two piece truck tires use a safety rack or chain. These rims can fly out with deadly force.
11. Utilize car stands, never work under a car that is suspended by a hoist or jack.
12. Do not use an air hose to clean off bearings, other people or yourself. Serious injury could result.
13. Remove all oil and grease spills from floor.
14. If you are not sure of your job or if malfunctions occur, summon your instructor.
15. Do not use steam cleaners until you fully understand how they operate; steam can cause serious burns or explosions.

16. Use extreme caution when using acid cleaning vats. Use correct clothing and eye protection.

17. Do not use hydraulic presses and pullers without proper instruction. Parts can shatter or fly loose.

18. Never hammer on ball bearings, tapered bearings or their races; they can shatter.

19. Return all tools and equipment to proper storage, and clean up after you are finished.

20. Modifications made on vehicles should only be done under direct supervision of the instructor and after careful consideration or contact with the manufacturer. Modifications may result in liability.

5.6 GENERAL SAFETY RULES FOR THE BUILDING TRADES

1. Hard hats must be worn on building site at all times.
2. Always wear safety glasses when tools and equipment are operating.
3. Wear protective footwear.
4. Always get help lifting heavy objects.
5. Wear tight fitting clothes, no loose sleeves or open jackets.
6. Never wear jewelry, especially rings. They have a tendency to get caught and cause injury.
7. Do not pass a hand tool or a power tool to another person unless it is unplugged.
8. Make sure that all guards are in place and working properly.
9. Keep scraps picked up at all times; maintain a clean job site.
10. Don't stand on the top of a step ladder. When you are near the top of a ladder have someone steady it.
11. Make sure that all ladders and scaffold are in good working order.
12. Ladders shall extend three feet above the roof line and be secured.

5.7 GENERAL SAFETY RULES FOR DRAFTING

1. The paper cutter used in most drafting rooms could be responsible for serious cuts and pinches. In most cases, it is advisable to have it fastened in a permanent location. When not being used it should be locked in the closed position. A barrier type guard secured to the cutter should be no more than 3/8 inch from the table, and located between the operators hands and the blade. Do not remove the guard.

2. Printers and developers, using ammonia, call for special safety instruction. Ammonia vapors in concentrated form are very toxic and should be used in a well ventilated area. Students should be advised not to inhale the vapors. If ammonia is spilled on the skin, it should be immediately washed off with soap and water. Respirators should be made available for emergency use.

3. Improper handling and use of compass, dividers, and hard lead pencils may result in painful skin punctures and eye injuries.

4. Keep all four legs of a chair on the ground when sitting in it. A majority of accidents in the drafting room are the result of not following this rule.

5. Use care in setting the adjustable table top.

5.8 GENERAL SAFETY RULES FOR THE ELECTRICITY/ ELECTRONICS LABORATORY

1. Consider all wires and terminals as live or hot until proven otherwise by a safe method of testing.
2. Never throw a breaker just to "see what happens".
3. Turn off power before replacing fuses.
4. Locate and correct the cause of a blown fuse or tripped breaker before replacing fuse or resetting breaker.
5. Experimental circuits and wiring practice boards should be fused properly.
6. Make wiring changes only with the power off.
7. Make sure wire size and insulation is correct for the job.
8. Disconnect or unplug equipment before working on it.
9. Make it a habit to check and replace damaged cords and plugs.
10. Make sure that portable electronic devices are properly grounded.
11. Never attempt to use a piece of electrical equipment that is known to be faulty.
12. Make sure that capacitors are discharged before touching.
13. Disconnect power cord before touching anything behind the front panel of a transmitter.
14. Remove headphones before working on equipment.
15. Wear gloves and face shield when handling a CRT (cathode ray tube). Old crt's should be disposed of in a steel barrel and broken with a steel rod shoved through the hole in the lid.
16. Do not wear jewelry in the electronics laboratory.
17. Always use goggles and/or face shield when soldering and handling batteries.
18. Keep sparks and open flames away from batteries especially when they are being charged.

5.9 SAFETY RULES FOR THE FOUNDRY AREA

1. Always wear safety glasses and face shield or helmet as needed.

2. Always treat crucibles, flasks, castings, and other equipment as if they were hot; pat before picking them up.

3. Ask instructor to check the mold before closing, then make sure that it is not too damp before pouring.

4. Keep molds covered before pouring.

5. Wear proper protective clothing when handling molten metal (face shield or helmet, apron, leggings and fireproof gloves). No tennis shoes.

6. Keep flammable materials away from the foundry area (paint, solvents, etc.).

7. Make a dry run by practice lifting and pouring with a cold crucible before making a live run.

8. Light the furnace only when supervised by the instructor. Follow the manufacturer's directions or the following steps:

   a. Purge the furnace by running air for two minutes with the gas off.

   b. Turn off air.

   c. Place a lighted torch in the furnace (if no auto-pilot).

   d. Turn air on slowly.

   e. Add fuel slowly. If the flame is blown out, start again with a.

   f. Adjust flame so that it is contained within the furnace (the loudest roar).

9. Preheat metal to remove moisture and raise temperature before placing it in a crucible of molten metal (especially brass or bronze).

10. Preheat skimmer or ladle before using.

11. Before removing crucible, shut off the gas first, then the air.

12. Carry molten metal as close to the floor as possible.

13. Molds should be placed on a sand floor for pouring.

14. Keep water and wet items away from the foundry area, except for tempering sand.

15. Allow ample time for solidification of castings (a minimum of ten minutes for small castings).

16. Always wear face shield or helmet when pouring, adding metal, or looking at the melt.

17. In consumable pattern casting (styrofoam) keep the sprue basin filled to prevent firing; do not breathe fumes. Ventilate well.

18. In hot-shell or CO2-shell molding, the two halves of the mold should be securely fastened and banked in a flask of green sand to dissipate heat; do not breathe fumes.

19. Empty crucible into an ingot mold. Solidified metal will expand upon reheating and may crack the crucible.

20. Keep tools and equipment off the floor and out of the sand; use and return to storage.

21. Return all equipment to its proper place, quench all hot castings and clean up the area.

5.10 GENERAL SAFETY RULES FOR METALWORKING

1. Wear proper eye protection at all times.
2. Keep work area free from scraps of metal.
3. Make sure that hammer heads and screwdriver blades are fastened tightly into their handles.
4. Keep metal cutting tools sharp.
5. Always put a handle on a file before using it.
6. Grind mushroom heads and all burrs off cold chisels, center punches and small hand tools.
7. Never carry tools in pockets.
8. Keep tools and machines clean and in good working order during and after use.
9. Never try to hold a piece of metal in your hand while it is being machined. Use a fixture or a clamp to hold the work piece.
10. Sheet metal is sharp. Infections can come from even the smallest scratches if not properly treated.
11. Get rid of waste material promptly.
12. Never use electrical equipment around flammable vapors or gases. This could cause an explosion.
13. Make sure that your hands are dry before using an electrical power tool.
14. Never use measuring tools on metals while they are being machined.
15. Always keep machine guards in place.
16. Operate a machine only after you have been instructed to do so.
17. Do not clean chips from a machine with bare hands--use a brush.

5.11 SAFETY RULES FOR GRAPHIC ARTS/PRINTING

1. A person should never work alone in the shop, nor in the darkroom.
2. The room itself should be of ample size, with adequate lighting and ventilation.
3. Floors should be smooth and unwaxed.
4. Wash-up and other working sinks should be provided in such locations and number as convenient for the workers.
5. Arrangement of equipment should follow straight-line patterns, with ample aisle space between rows to allow the passage of stock carts and drying racks while workers are at their stations.
6. Storage rooms should be provided for paper stock, supplies, etc. Heavy or breakable items should be stored on the floor beneath the shelves or on the lowest shelves.
7. No "horseplay" of any kind can be permitted --no "joking" about a machine, no tossing of an item to another person, no splashing of water, etc. Such conduct engenders unsafe habits and is likely to cause serious injury.
8. No person should mix any solutions, handle any chemicals, or operate or adjust any equipment without receiving thorough instruction in use and dangers and judged being competent in use by the instructor.
9. Wash thoroughly with hot water and soap after handling chemicals and solvents.
11. Never mix solutions near eyes or face. Keep them at arm's length.
12. At all times when mixing or pouring chemicals, wear approved safety shields and/or goggles.

5.11.1 DARKROOM

1. Turn on ventilator fan when in the dark room.
2. Chemicals should not be stored in glass bottles or on high shelves where they may fall and cause injury.

3. Proper eye protection and an apron should be worn when preparing chemical solutions. Always add acid to water--never the opposite.

4. Tongs or rubber gloves must be used in handling film in the developing process and for mixing chemicals.

5. Keep hands away from face while working in the dark room.

6. Wash hands carefully after developing film.

7. Portable electrical devices should not be used around or within reaching distance of sinks.

8. There shall be no unsafe conduct in the darkroom.

9. All spills should be wiped up immediately.

10. If chemical spills on clothing wash immediately.

11. An absolute necessity for the darkroom is a strong intake air fan. If doors are used, light-tight louvers are needed to insure good exhaust of fumes.

5.11.2 DRY MOUNT

1. Use caution to avoid burning yourself on the press or tacking iron.

2. Dry mount with heat setting prescribed by the instructor only.

3. Turn off and unplug press and tacking iron at end of the process.

4. Do not lay hot tacking iron down on papers or on the counter but return it to holder.

5. Report worn electrical cords and plugs to instructor.

6. Never test heat of press or tacking iron by touching.

5.11.3 PROCESS CAMERA

1. Do not touch hot lights.

2. Avoid flashing lights in other's eyes.

3. Caution should be exercised around glass copy board.

5.11.4 STRIPPING TABLES

1. All foreign material should be kept off the glass so it will not be broken.
2. Keep fingers out of cutting area when cutting a flat.
3. The cutting devices should be stored properly and kept sharp.

5.11.5 FOLDING MACHINE

1. Never attempt to remove a misfed or jammed sheet while the machine is running.
2. Turn off the power when making changes.
3. Keep all tools off the tables of the folder.
4. Be sure electrical cord is out of the way.

5.11.6 PLATE MAKER

1. Disconnect the plate maker before changing carbons or making adjustments. Be careful of hot carbons when changing.
2. Never look at arc lights during operation.
3. Be careful not to break glass of vacuum frame.

5.11.7 PAPER DRILL

1. Be aware that drill bit may be hot.
2. Keep hands away from drill area while drilling.
3. Keep area around feet clear at all times.

5.11.8 AIR BRUSH

1. Have instructor connect and disconnect regulators to high pressure air line.
2. Do not adjust regulators without proper instruction.

3. Take care not to spray toward other's faces.

5.11.9 SIGN PRESS

1. Do not throw or toss type.
2. Utilize caution in keeping hand out of roller.
3. Use only specified cleaning solutions in cleaning type and press.
4. Do not lift or carry press during cleanup.

5.11.10 ENGRAVING

1. Eye protection must be worn when engraving.
2. Keep hands from under cutter bit.
3. The instructor will change or adjust engraving cutters.

5.11.11 THERMOGRAPHY

1. Dark goggles must be worn by all students in the area when heating the relief powder.
2. Students in the area are not to stare at the heat lamp.
3. Do not leave area when the lamp is on and relief powder is heating; fire may result.

5.11.12 RUBBER STAMP AND GOLD STAMPING

1. Exercise caution when using heating element.
2. Keep work surface clean at all times.
3. Do not throw or drop type.

5.11.13 PAPER SHEAR

1. Properly position blade guard.
2. Keep fingers away from shear blade.
3. Do not exceed proper paper thickness.

5.12 GENERAL SAFETY RULES FOR PLASTICS

1. Wear eye protection.
2. Never mix materials unless you understand the reaction of the mixture.
3. Use ventilation, toxic vapors are given off.
4. Keep flames out of the area where the plastics are being worked.
5. Use protection where materials will cause skin irritation.
6. Use a face mask and respirator with proper filters when sanding fiberglass or other materials that make hazardous dust.
7. Keep materials with low flash points under refrigeration.
8. Keep all guards in place when operating any plastics machine.
9. Wherever a heating unit is to be placed, warning and protection should be provided.
10. Use only recommended materials and procedures for injection molding and forming process.
11. When using wood and/or metal working machines, make sure the safety rules for those areas are followed.
12. Clean up area and return all equipment and tools to storage areas after use.

5.13 GENERAL SAFETY RULES FOR WOODWORKING

1. Wear eye protection.
2. Always keep tools and equipment in top condition.
3. Follow the safety recommendations for each power tool.
4. Wear tight fitting clothing and roll up sleeves.
5. Do not wear jewelry.
6. When working with large pieces of wood obtain help if needed. Also wear sturdy non-slip shoes.
7. Keep materials neatly stacked.
8. Keep work area clean and free from small scraps, excess sawdust, and oil.
9. Always remove nails from boards that come from remodels.
10. Keep machine tables and other work areas free from nails, tools, and other materials.
11. Never try to move materials past a person who is using a power tool.
12. Never attempt to talk to or otherwise startle a person using a power tool or machine.
13. Never start or stop a machine for someone else. Always follow the operators instructions when helping another person.
14. Make sure that all hand tools are sharp.
15. Always carry sharp pointed objects away from body.
16. Never hold small pieces of wood in hands when cutting it. Use a clamp or jig.
17. Always use the guards that are provided on machines. Make use of clamps and push sticks.
18. Never use power tools if tired or in a hurry.

19. Make sure that the machine has come to a complete dead stop. Unplug before adjusting, changing the blade or oiling the machine.

20. Always wear a face mask in addition to safety glasses when there is a danger of flying chips.

21. Get first aid treatment for even the slightest injury.

22. Wear a respirator while sanding.

23. Wear ear protection such as ear plugs when excessive noise is a problem.

24. Know the location and type of fire extinguishers and their proper uses.

25. Return all finishing materials to metal containers and cabinets.

26. Place all oily rags in an approved metal storage container.

27. Use the dust collection system for all stationary machines if possible.

28. Keep hands and fingers out of the path of sharp edged cutting tools.

29. Be careful of operating circular saws that are lighted by fluorescent lights because of their "strobing effect".

30. Do not clean wood chips, sawdust, etc., from machines with bare hands.

5.14 GENERAL SAFETY RULES FOR THE LASER

1. Always determine the classification of the laser in use and follow the manufacturer's recommended safety procedures. Classes I, II, III, and IV, are common laser classifications.

2. Do not operate the laser without instructor permission and without prior instruction.

3. Never look into the laser beam.

4. Never direct the laser beam into another person's eyes.

5. Do not use the laser for any other purpose than what you were instructed to do.

6. Never leave the laser on and the beam emitting out.

7. Do not look at bright mirror-like reflections of the beam.

8. Appropriate caution signs should be posted.

9. Block off the beam at a point beyond the farthest part of interest. Use a dull, nonreflective object, like a piece of wood.

10. If the beam must travel a long distance, keep it close to the ground or overhead so that it does not cross walkways at eye level.

11. Always make sure the laser is grounded correctly.

12. Wear the appropriate eye protection and protective clothing if working with a higher class laser.

13. A protective housing shall be provided for all lasers or laser systems where it is necessary to limit the maximum accessible laser radiation to that level which defines the classification assigned.

14. High-pressure arc lamps and filament lamps shall be enclosed in housings which can withstand the maximum explosive pressures resulting from plant disintegration.

15. Gas laser tubes and flash lamps shall be supported to ensure that their terminals cannot make any contact which will result in a shock or fire hazard in the event of a tube or lamp failure.

16. For laser equipment intended for general use, interlock switches and capacitor bleeder resistors if applicable or their equivalent shall be installed to remove the voltage from accessible line parts to permit servicing operation.

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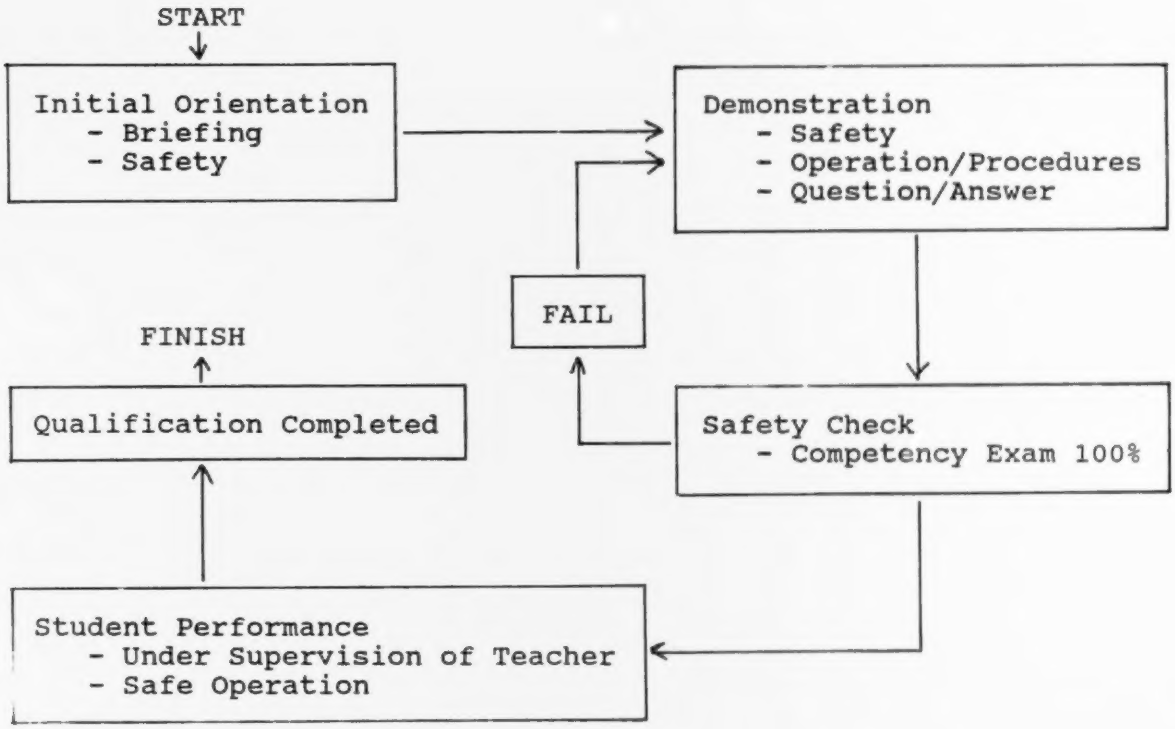
6.0 TOOLS AND EQUIPMENT

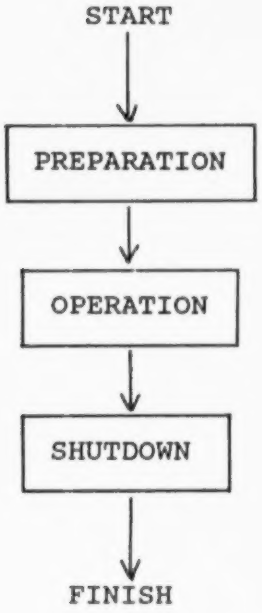
Prior to the use of any power tools or machines by students, the instructor must be assured the student is aware of the operational procedures. It is important to obtain permission from the instructor before a student uses any machines. The operation of some equipment may require the direct supervision and assistance of the teacher.

6.1 QUALIFYING ON MACHINES AND POWER EQUIPMENT


START
Initial Orientation
- Briefing
- Safety
Demonstration
- Safety
- Operation/Procedures
- Question/Answer
FAIL
Safety Check
- Competency Exam 100%
FINISH
Qualification Completed
Student Performance
- Under Supervision of Teacher
- Safe Operation

To assist in providing a procedure for student use of machinery, the following basic cycle applies to the operation of any machine. The three phases are: (1) Preparation, (2) Operation, and (3) Shut Down. This cycle should serve as a checklist by the student while doing work.

6.2 OPERATIONS/PROCEDURES FOR MACHINES


START
PREPARATION
OPERATION
SHUTDOWN
FINISH

6.2.1 PREPARATION

1. Obtain permission from the teacher.
2. Clear the area for work. Keep the machine and surrounding floor space clear of tools, scraps, or any spilled liquids.
3. Wear proper clothing. No jewelry, loose clothing, or unconfined long hair.
4. Disconnect power.
5. Inspect machine, machine wiring, switches, and guards to see that they operate properly. Perform any maintenance or major adjustments. If extension cords are needed, use only the heavy duty three wire ground type.
6. Use proper protective gear.

6.2.2 OPERATION

1. Set up for operation.
2. Ask instructor to check set up.
3. Remove adjusting wrenches or keys.
4. Place guards in proper position.
5. Secure work.
6. Maintain proper footing.
7. Make sure others are clear.
8. Connect machine.
9. Power on . . . CAUTION
    - * Allow machine to reach full operating speed before applying work
    - * Give the machine your undivided attention while you are using it
    - * Allow a minimum of four inches between your hands and blades, cutters, or moving parts

- * Only one person should be operating a machine unless an operation requires a helper
- * Wear appropriate protective devices

10. Notify instructor of any break or malfunction.
    - * Power turned off
    - * Step clear of danger
    - * Wait till machine comes to a dead stop
    - * Notify instructor

6.2.3 SHUT DOWN

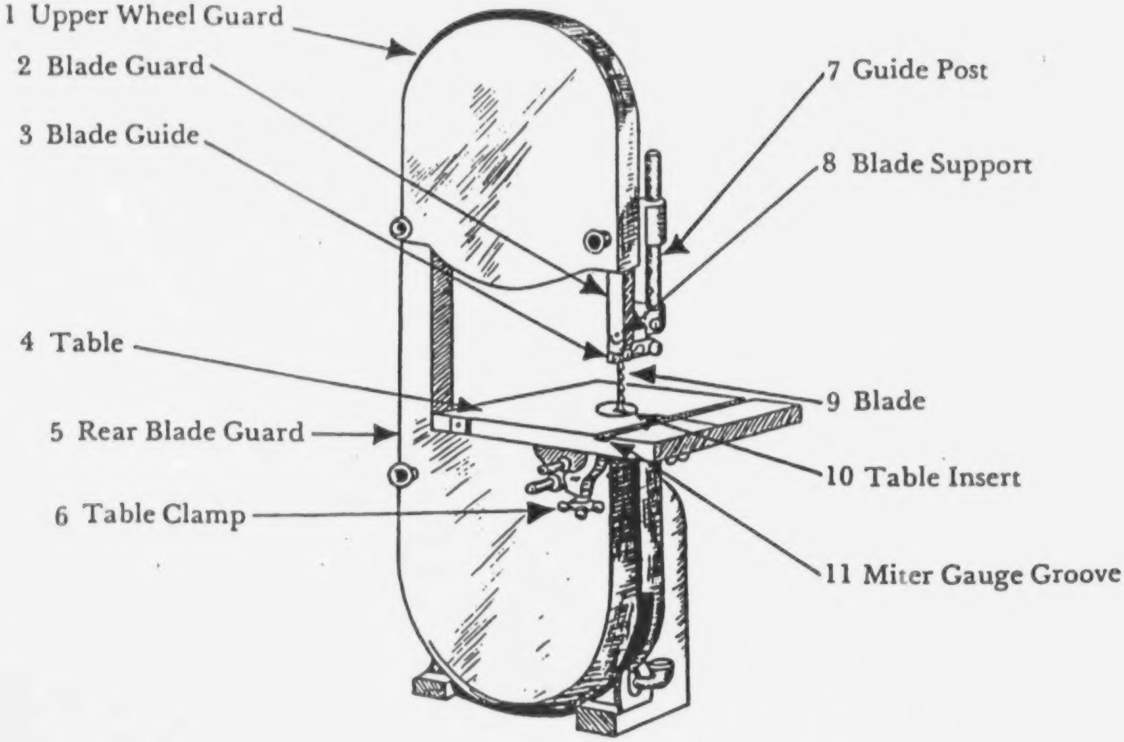
1. Power off.
2. All parts of machine stopped.
3. Remove materials from machine.
4. Disconnect power.
5. Clean machine.

6.3 SAFETY RULES FOR THE BANDSAW

1. Wear safety glasses.
2. Make all adjustments with the machine at a dead stop.
3. Stock to be cut should have one flat side for placing against the table.
4. Examine cutting procedure; plan cuts to avoid backing out of a kerf. Do relief cuts first.
5. Check the blade to see if it is suited for cutting your material (wood, metal, plastic, etc.).
6. If the machine is variable speed, adjust blade speed as recommended.
7. Adjust the top blade guide to within approximately one-eighth inch of the workplace.
8. Allow the machine to reach full speed before sawing.
9. Feed the material at a moderate speed, not overloading the machine.
10. Keep hands and fingers in a position where there is no danger of them slipping into the blade.
11. Do not pass fingers or hands within four inches of the blade.
12. Avoid pinching the blade by turning work too sharply.
13. If a blade breaks, shut off the machine and call the instructor.
14. If a blade hangs or stops, do not touch, shut off the machine and call the instructor.
15. Clean off or remove scrap stock only when the machine is at a dead stop.
16. Have the instructor check resawing, angle cuts, and all other special operations.
17. Allow the machine to come to a dead stop; clean up scrap material from the machine and floor.

18. Do not leave the machine until it reaches a dead stop.

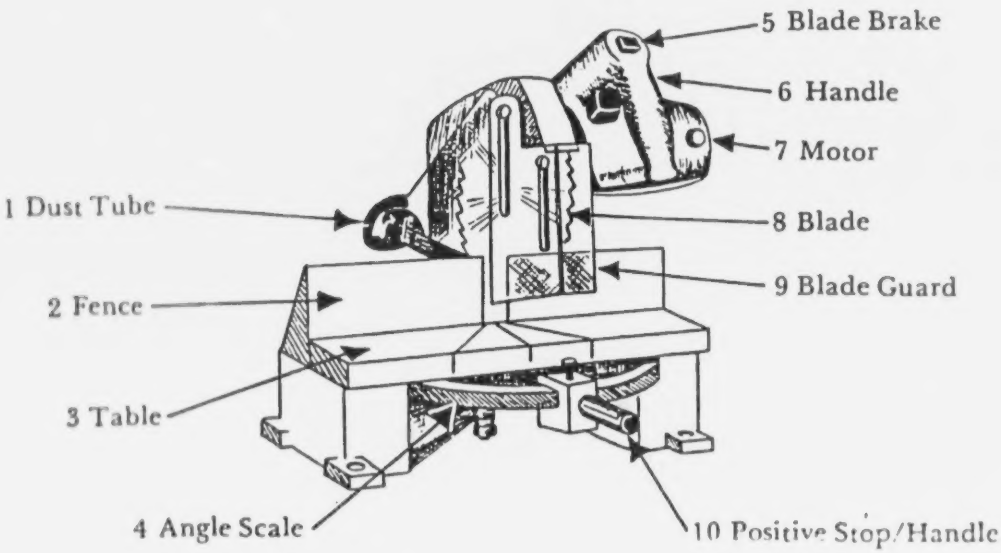
BANDSAW


1 Upper Wheel Guard
2 Blade Guard
3 Blade Guide
4 Table
5 Rear Blade Guard
6 Table Clamp
7 Guide Post
8 Blade Support
9 Blade
10 Table Insert
11 Miter Gauge Groove

6.4 SAFETY RULES FOR THE MOTORIZED MITER BOX

1. Operate only with instructor's permission and after you have receiving instruction.
2. Remove jewelry, eliminate loose clothing, and confine long hair.
3. Make sure all guards are in place and operating correctly.
4. Always use proper eye protection.
5. Be sure power is disconnected before making angle adjustments or changing blades.
6. Always hold the work firmly against the fence and table.
7. Install a new table if adequate support has been cut away.
8. Allow the motor to reach full speed before starting to cut.
9. Use the brake to stop the blade before removing scrap or chips from the work area.
10. Be sure guard parts are functioning properly.

MOTORIZED MITER BOX

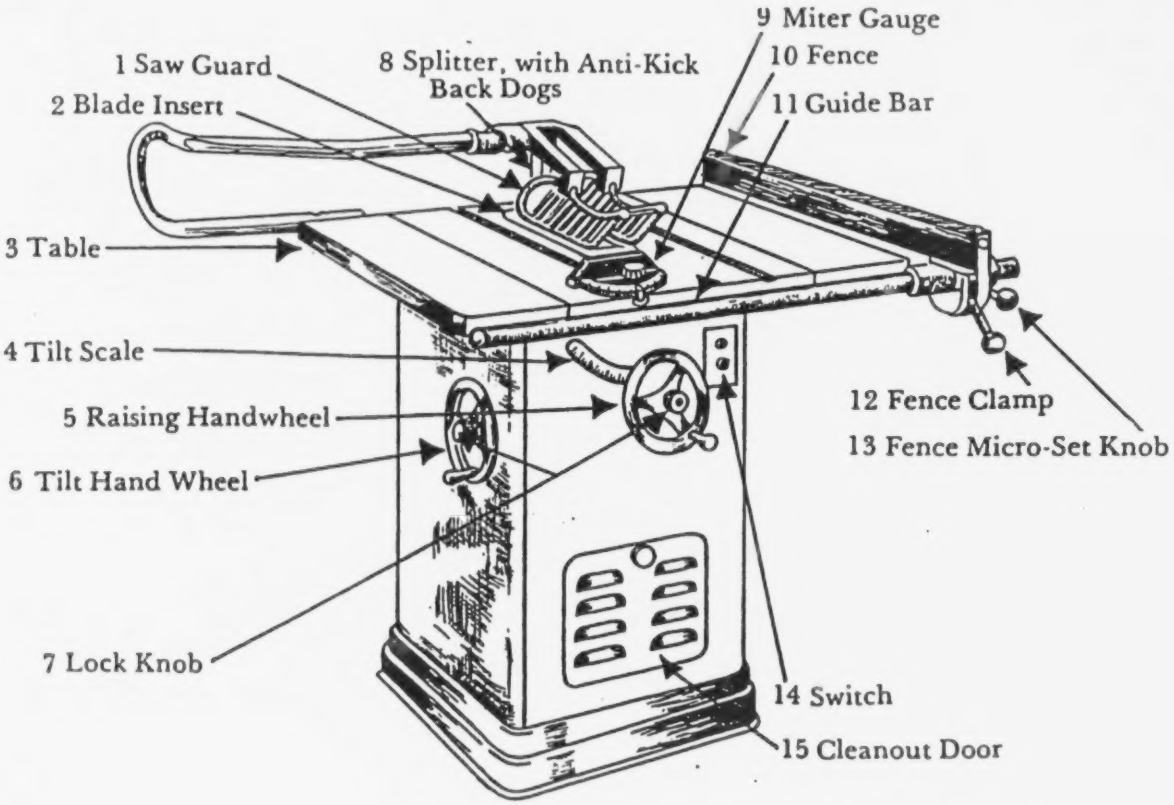

5 Blade Brake
6 Handle
7 Motor
1 Dust Tube
8 Blade
9 Blade Guard
2 Fence
3 Table
4 Angle Scale
10 Positive Stop/Handle

6.5 SAFETY RULES FOR THE CIRCULAR SAW (TABLE SAW)

1. Wear safety glasses.
2. Saw only clean, nail-free lumber with the loose knots removed.
3. Make all adjustments with the machine at a dead stop.
4. Check the blade to make sure it is the correct type for your operation and that it is properly installed.
5. Cracked blades should be discarded immediately.
6. Never saw "free hand" without the ripping fence or miter gauge.
7. Check the operation of the guard, and do not perform any operation requiring removal of it without the instructor's assistance.
8. Do not use the ripping fence and miter gauge at the same time without special permission.
9. Special jigs for certain operations should be used with caution. Use feather board if needed.
10. Allow the machine to reach maximum speed before sawing.
11. Use a push stick for ripping stock less than six inches wide.
12. The saw blade should not extend over one-eighth inch above the work piece.
13. Never reach over the saw blade or remove scraps from the saw table until the machine has come to a dead stop.
14. Get help or use support stand when cutting large pieces of stock.
15. When using the dado head, do not back up on a cut.
16. When ripping use only a true edge against the fence and make sure that the fence is locked on both ends. Stand to the side of stock--not in line with the blade.

17. Feed the material at a reasonable rate. Do not overload the machine or feed so slow as to burn the wood.
18. Allow the machine to come to a dead stop; then return adjustments to normal and clean up machine and area.
19. Do not leave the machine until it has reached a dead stop.
20. Turn on dust collection system before use, turn off system when finished.

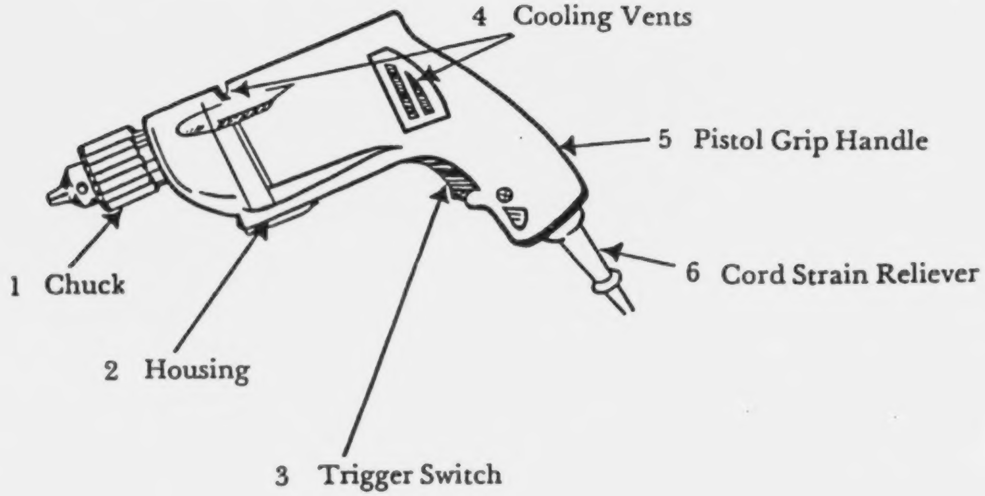
CIRCULAR SAW


1 Saw Guard
2 Blade Insert
3 Table
4 Tilt Scale
5 Raising Handwheel
6 Tilt Hand Wheel
7 Lock Knob
8 Splitter, with Anti-Kick Back Dogs
9 Miter Gauge
10 Fence
11 Guide Bar
12 Fence Clamp
13 Fence Micro-Set Knob
14 Switch
15 Cleanout Door

6.6 SAFETY RULE FOR THE PORTABLE ELECTRIC DRILL (ELECTRIC HAND DRILL)

1. Wear safety glasses.
2. Select the proper drill and drill bit and check it for sharpness.
3. Insert the drill bit in the chuck and tighten before plugging in the power cord.
4. Remove key from chuck after tightening or removing drill bit.
5. Use only drills and cords with a grounded plug, and do not string extension cords across aisles.
6. Use only heavy duty extension cords.
7. Keep hands away from the chuck and drill bit when in operation.
8. Secure small work, sheet metal, etc., with clamps or in a vise.
9. Use coolant when necessary.
10. Center punch for holes in metal. Drill pilot hole if necessary.
11. Hold drill firmly and turn on. Both hands are generally needed to hold the drill.
12. Apply straight and steady pressure, keeping clothing clear of drill bit and chuck.
13. Ease up on pressure before the drill breaks through. This is when the drill bit will hang in the work.
14. Do not drill through cloth or net wire.
15. Do not touch the bit after drilling. It will be hot.
16. Remove the bit from the chuck and return all equipment to its proper place after cleaning up the area.
17. Do not lay drill down until it has reached a dead stop.

PORTABLE ELECTRIC DRILL

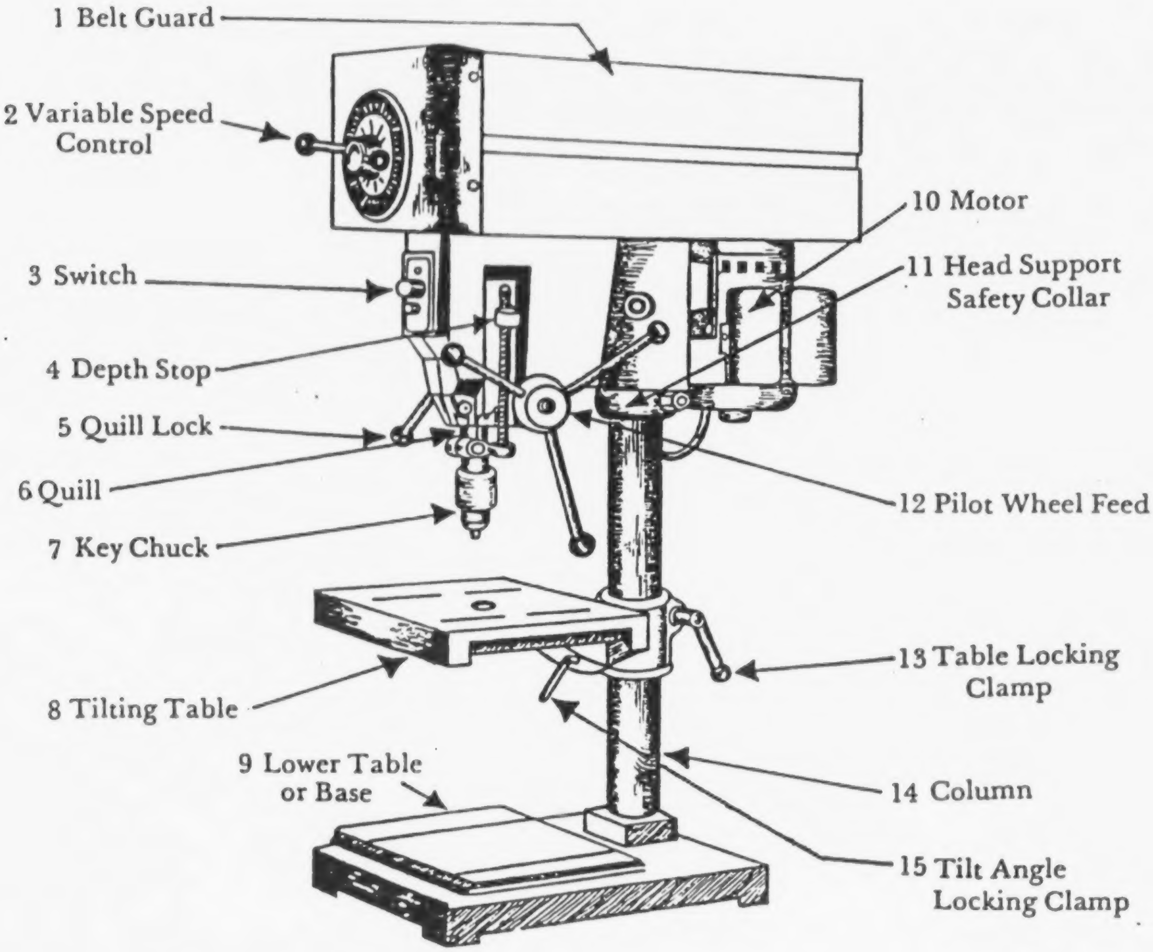

4 Cooling Vents
5 Pistol Grip Handle
6 Cord Strain Reliever
1 Chuck
2 Housing
3 Trigger Switch

6.7 SAFETY RULES FOR THE DRILL PRESS

1. Wear safety glasses.
2. Select the correct size and type of drill bit, and check it for sharpness. Sharpen the drill for a shear or scraping cut if necessary.
3. Select the correct speed for the size of drill bit and type of material to be drilled.
4. Tighten the drill bit securely in the chuck and remove the chuck key.
5. Center punch location of hold position.
6. Back up thin material with a wooden block.
7. Locate the work piece and clamp it securely in place to the table.
8. Determine whether or not a coolant should be used; if needed, select proper type and use as needed.
9. Check setup before applying power.
10. Operate feed so that the drill bit cuts evenly into the work--not too fast or too slow.
11. Ease up on feed pressure as drill bit begins to break through stock. This is when the drill bit will hang.
12. Back the drill bit out as soon as the hole is completed with the drill still running.
13. If the work piece comes loose or hangs on the drill bit, step away. Shut off the power if possible without danger to yourself; then call your instructor. Do not release pressure.
14. Stop the drill press before removing chips. Use a brush, not your hand or a rag.
15. Clean up the machine, holding devices, drill bits, and floor. Return bits, coolant, and holding devices to their proper places.
16. Do not leave the machine until it reaches a dead stop.

17. If a hole saw is used, drill a relief hole on the edge of the hole circumference. This will reduce the pressure on the cutting teeth.

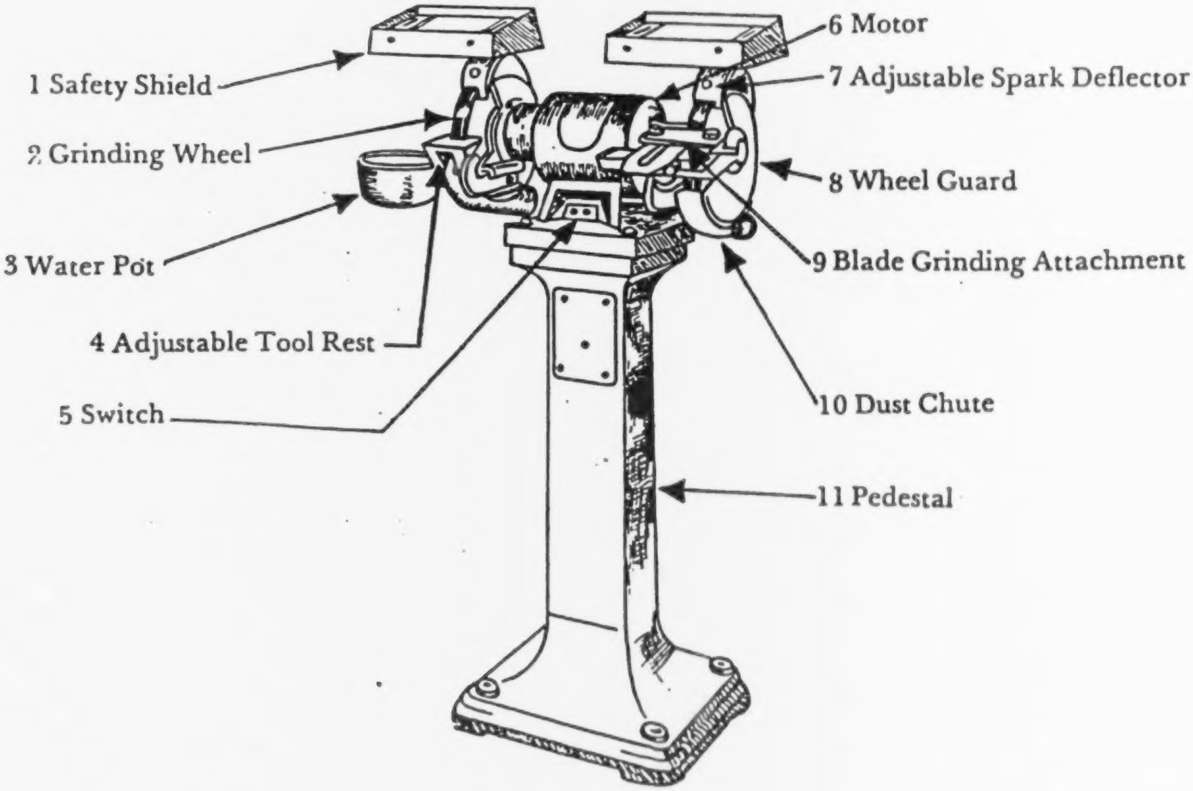
DRILL PRESS


1 Belt Guard
2 Variable Speed Control
3 Switch
4 Depth Stop
5 Quill Lock
6 Quill
7 Key Chuck
8 Tilting Table
9 Lower Table or Base
10 Motor
11 Head Support Safety Collar
12 Pilot Wheel Feed
13 Table Locking Clamp
14 Column
15 Tilt Angle Locking Clamp

6.8 SAFETY RULES FOR OFFHAND ELECTRIC GRINDERS

1. Wear safety glasses and a face shield.
2. Check and make sure that tool rest is not over one-eighth an inch away from the wheel. Adjust clearance and angle if necessary.
3. Never attempt to use a grinder unless the wheel guards are in place.
4. Check grinding wheel for cracks.
5. Select the proper grinding wheel for the job.
6. Make all adjustments with the machine at a dead stop.
7. Never force work against the grinding wheel or use a wheel that is glazed or loaded.
8. Use a wheel dresser only after having received instruction on how to use it.
9. Do not operate grinding wheels above the speed recommended by the manufacturer.
10. Always stand to one side when turning on power.
11. Keep work piece in motion across the face of the wheel. Do not grind on the sides of the wheel.
12. Do not burn or overheat work; quench as needed.
13. Do not use gloves or pliers for holding small work--only clamping devices, such as vise grips.
14. Keep hands and fingers clear of the wheel.
15. Allow the machine to reach a dead stop before leaving it.
16. Glass safety shield should be clean.
17. Spark arrestor or top guard must be within 1/8" of wheel.
18. Use correct dust collecting system for grinding dust (nonexplosive system for aluminum dust).

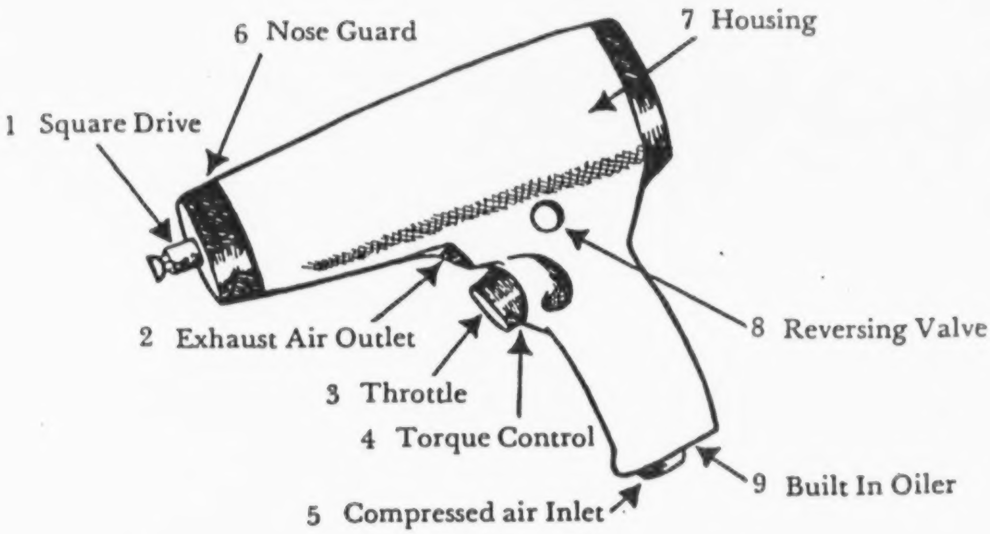
GRINDER


1 Safety Shield
2 Grinding Wheel
3 Water Pot
4 Adjustable Tool Rest
5 Switch
6 Motor
7 Adjustable Spark Deflector
8 Wheel Guard
9 Blade Grinding Attachment
10 Dust Chute
11 Pedestal

6.9 SAFETY RULES FOR IMPACT WRENCH (PORTABLE AIR)

1. Wear safety glasses.
2. Make sure all guards are in place and operating correctly.
3. Be sure throttle is in the off position before connecting to air supply.
4. Always use impact type sockets designed for use with power equipment.
5. Make sure work is secure or held with clamps or tightly in a vise.
6. Set torque control for correct tightness before starting the job.
7. Be sure both hands are free to properly operate an impact tool. Maintain balance and firm footing at all times.
8. Always use the tool in short bursts of power.
9. Quick change coupling should be at end of hose whip, not at the tool.
10. Always disconnect the tool when not in actual use.

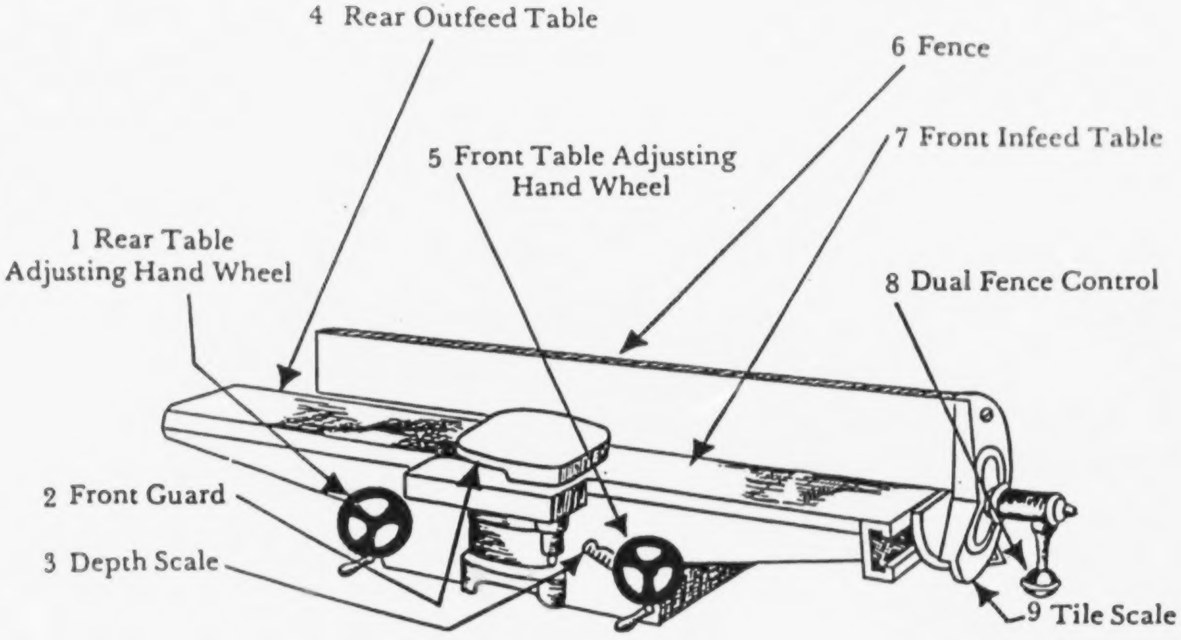
IMPACT WRENCH


6 Nose Guard
7 Housing
1 Square Drive
2 Exhaust Air Outlet
8 Reversing Valve
3 Throttle
4 Torque Control
9 Built In Oiler
5 Compressed air Inlet

6.10 SAFETY RULES FOR THE WOOD JOINTER

1. Wear safety glasses.
2. Make all adjustments before applying power.
3. Do not attempt to plane stock less than 1/2" x 4" x 12".
4. Check the guard to see if it functions properly, and will not stick.
5. Check the fence to see if it is locked in position.
6. Allow the machine to reach full speed before planing.
7. Use a push block for surfacing.
8. Do not pass hands or fingers over the cutting head unless absolutely necessary.
9. Do not cut end grain, bevels, tapers, and rabbets without special permission.
10. Limit cuts to one-eighth inch or less. One-sixteenth inch is a normal cut.
11. Feed stock slowly while holding it firmly against the table and fence.
12. Push stock far enough on each pass to allow the guard to close.
13. Plane with the grain.
14. Adjust only the infeed table. If the outfeed table needs adjusting, notify the instructor.
15. Stand to the left side of the machine--not behind it. Take a stance that will allow good balance during the operation.
16. Allow the machine to come to a dead stop before leaving it.
17. Return all adjustments to "normal" and clean up the area.

WOOD JOINTER

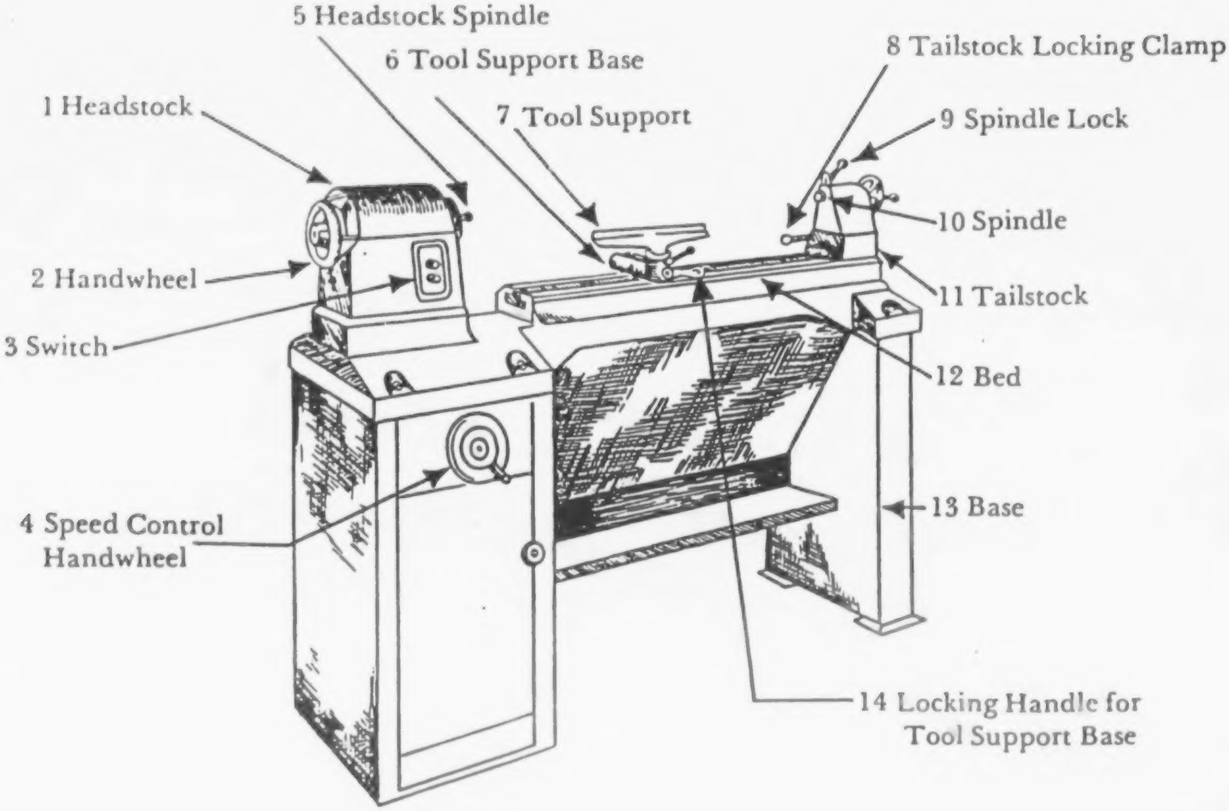

4 Rear Outfeed Table
6 Fence
7 Front Infeed Table
5 Front Table Adjusting Hand Wheel
1 Rear Table Adjusting Hand Wheel
8 Dual Fence Control
2 Front Guard
3 Depth Scale
9 Tile Scale

6.11 SAFETY RULES FOR THE WOOD LATHE

1. Wear safety glasses.
2. Make all adjustments with the machines at a dead stop, other than speed adjustments on continuous variable speed machines.
3. On large stock, remove corners by sawing or planing.
4. Have the instructor check your setup on all lathe operations.
5. Have the instructor check glued-up materials (allow minimum of 24 hours drying time).
6. Mount stock properly in a lathe, adjust tool rest within 1/8 inch of stock, and select proper turning tool.
7. Rotate stock by hand before applying power. Place guards in correct positions.
8. Make sure that centers are embedded in wood and that the tail stock is firmly clamped; lubricate dead center.
9. Stop frequently to check work and move the tool rest to within 1/8 inch of the work place.
10. Never touch or measure rotating stock.
11. Remove tool rest for sanding or polishing.
12. Use only small cloth pads for finishing and polishing; never a long or large piece of cloth.
13. Rough turn to cylindrical shape at low speed.
14. Center work on face plate and use the correct number and length of screws.
15. Never turn large diameters at high rates of speed.
16. If turning outboard, be careful not to kick or bump the stand.
17. Allow the machine to reach a dead stop, remove work piece, return to lowest speed, and clean up area.

18. Do not leave the machine until it has reached a dead stop.
19. Keep cutting tools sharp.

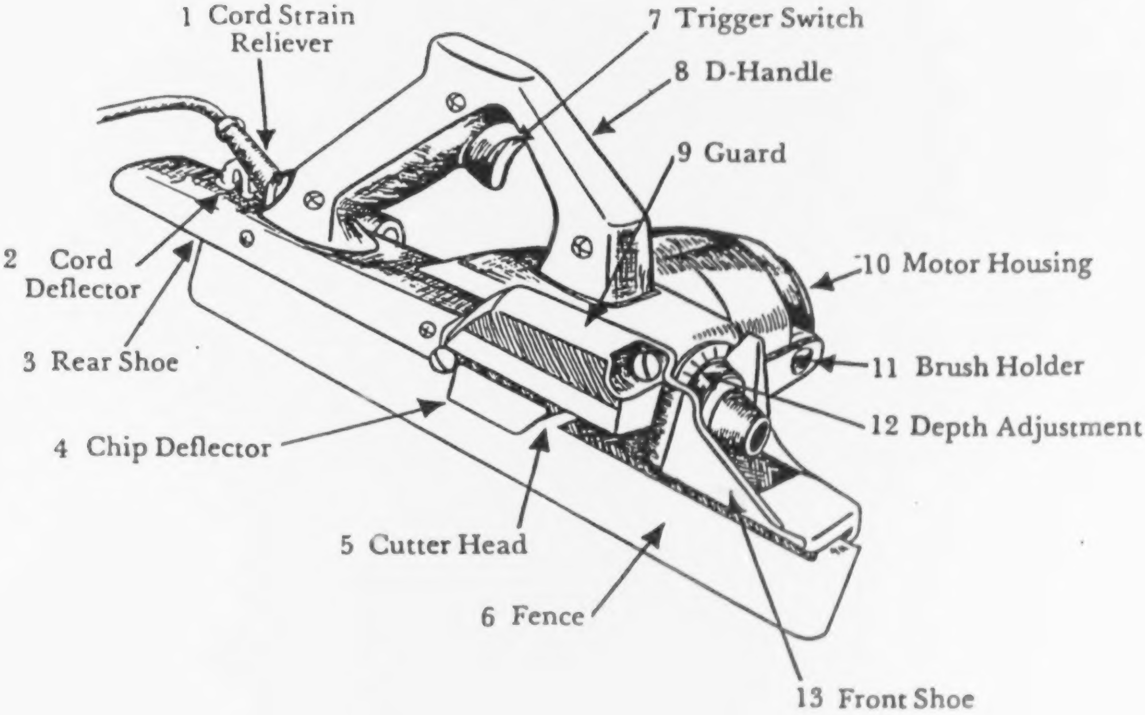
WOOD LATHE


5 Headstock Spindle
6 Tool Support Base
8 Tailstock Locking Clamp
1 Headstock
7 Tool Support
9 Spindle Lock
10 Spindle
2 Handwheel
11 Tailstock
3 Switch
12 Bed
13 Base
4 Speed Control Handwheel
14 Locking Handle for Tool Support Base

6.12 SAFETY RULES FOR PORTABLE POWER PLANES

1. Wear safety glasses.
2. Do not wear loose clothing that could become entangled in the cutters.
3. Do not use extension cords without three-pronged grounded plugs, and do not string cords across the aisles.
4. Do not operate the machine in damp or wet areas.
5. The work piece should be securely mounted before planing.
6. Before connecting the power supply, always make sure that the switch is in the "off" position.
7. Hold the machine firmly in both hands when operating.
8. Do not operate the plane in an out-of-balance position.
9. Do not hand the machine to another person without disconnecting the power supply.
10. Allow the machine to reach full power and then feed the cutters slowly into the wood. Do not move so slowly as to burn the cutters or wood.
11. Be careful of nails, screws, and knots in the work material.
12. Always disconnect the power cord before adjusting or changing cutters.
13. Upon completion of a cut, allow the machine to come to a complete stop before laying it down.
14. When finished, clean the machine and return it to the proper storage place.

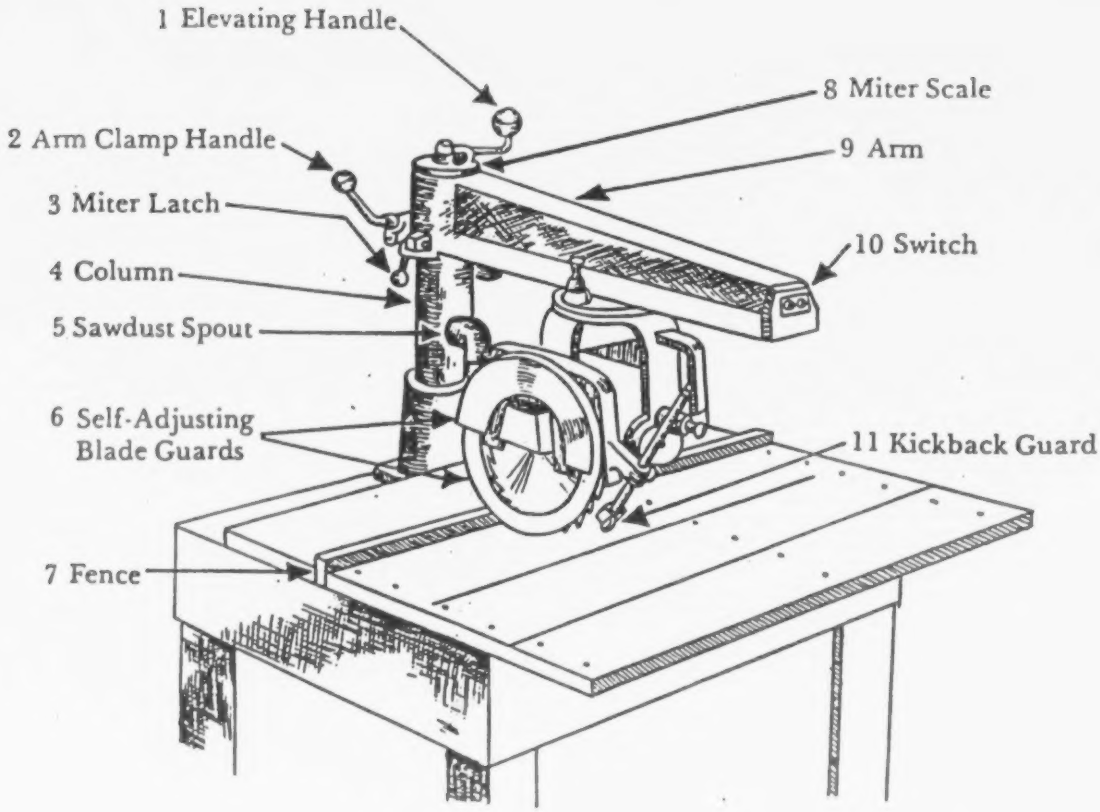
PORTABLE POWER PLANE


1 Cord Strain Reliever
2 Cord Deflector
3 Rear Shoe
4 Chip Deflector
5 Cutter Head
6 Fence
7 Trigger Switch
8 D-Handle
9 Guard
10 Motor Housing
11 Brush Holder
12 Depth Adjustment
13 Front Shoe

6.13 SAFETY RULES FOR THE RADIAL ARM SAW

1. Wear safety glasses.
2. Make no adjustments unless the machine is at a dead stop.
3. Do not perform any operations before the instructor has checked the setup and has given permission.
4. Hold stock firmly against fence; keep hands a minimum of six inches away from the blade line (path the blade will follow).
5. Do not allow the saw to pull itself across the work and overload the machine.
6. Allow the machine to reach full speed before sawing.
7. Cut only one piece of stock at a time.
8. Make sure the blade is returned to the starting position before advancing board for next cut.
9. When ripping or ploughing always make sure the anti-kick-back guard is in operation and feed the stock from the end opposite this guard. (Operation not recommended.)
10. Do not cross arm saw when using this machine.
11. Always return the saw to its starting position before removing stock.
12. Dado work should be approached with caution.
13. When finished, allow the blade to come to a dead stop, lock in starting position, and then clean up the area.
14. Do not leave machine until it has come to a dead stop.
15. Be sure blade will not extend beyond the front of the table.

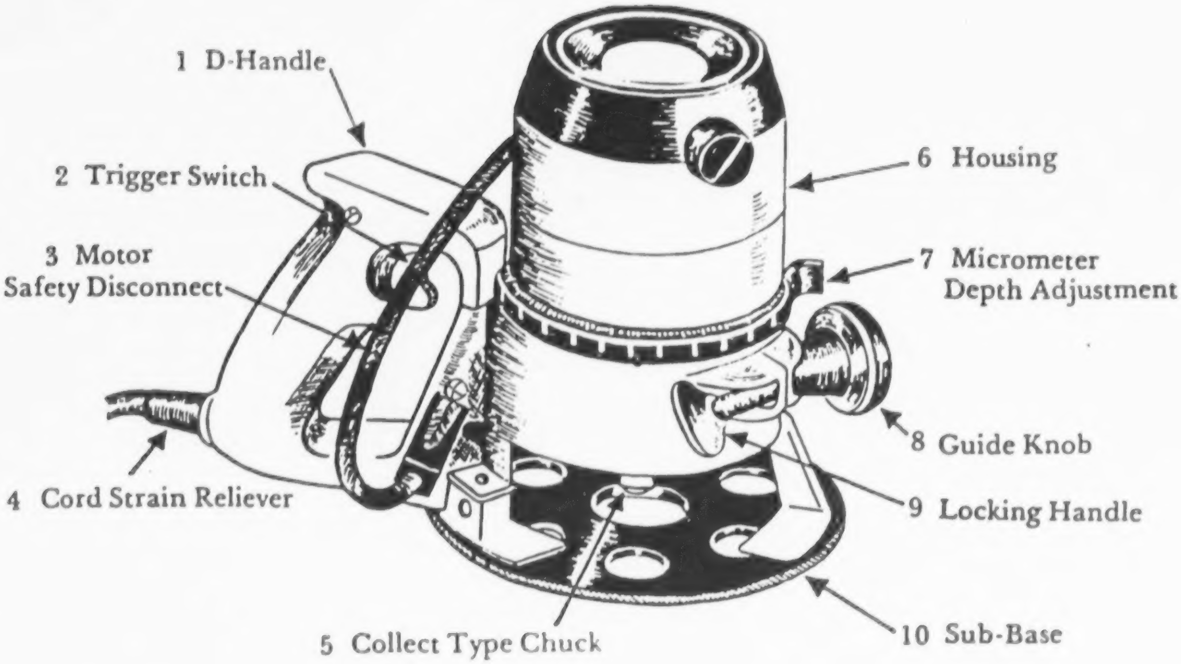
RADIAL ARM SAW


1 Elevating Handle
2 Arm Clamp Handle
3 Miter Latch
4 Column
5 Sawdust Spout
6 Self-Adjusting Blade Guards
7 Fence
8 Miter Scale
9 Arm
10 Switch
11 Kickback Guard

6.14 SAFETY RULES FOR THE PORTABLE ELECTRICAL ROUTER

1. Wear safety glasses and a face shield. Fasten back loose hair to prevent entanglement.
2. The work piece should be firmly secured with clamps or secured in a vise.
3. Make all adjustments and cutter changes only when the cord is disconnected.
4. Make certain that the cutters are tight in the chuck and the adjustments are locked.
5. Sharpen (hone) cutters before use if needed.
6. Ask the instructor to check your setup.
7. Before plugging in the electrical cord, make sure that the switch is off and the machine is lying on its side or in a special stand.
8. Do not lay the machine down until it has reached a dead stop.
9. Feed the cutters slowly into the material, but do not move so slowly as to burn the cutters and wood. Feed is opposite to cutter rotation.
10. Several light cuts are safer than wide or deep cuts.
11. Do not string extension cords across aisles.
12. Do not use cords without three-pronged ground plugs, and do not operate the machine in wet or damp areas.
13. Disconnect cords and remove cutters when finished with operation.
14. Clean up area and return tools and equipment to proper storage.
15. Make a trial cut in a similar scrap material.

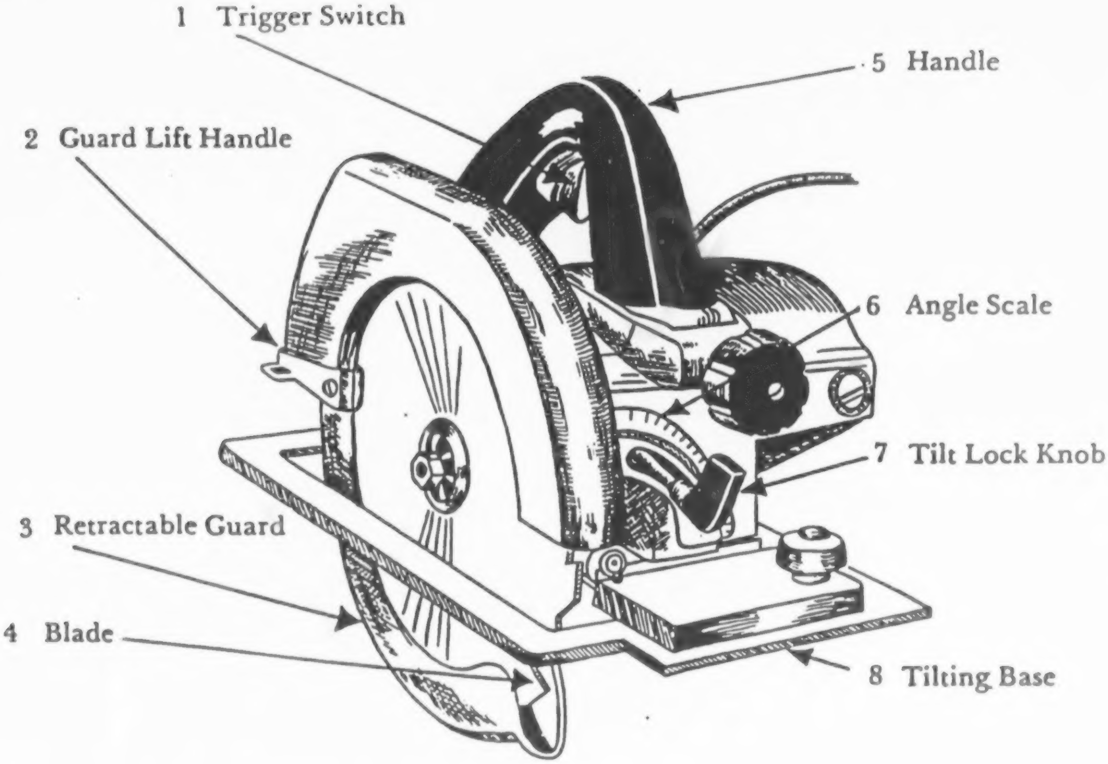
ROUTER


1 D-Handle
2 Trigger Switch
3 Motor Safety Disconnect
4 Cord Strain Reliever
5 Collect Type Chuck
6 Housing
7 Micrometer Depth Adjustment
8 Guide Knob
9 Locking Handle
10 Sub-Base

6.15 SAFETY RULES FOR PORTABLE ELECTRIC SAWS

1. Wear safety glasses.
2. Use the proper blade for the job and do not change blades unless the power cord is disconnected.
3. Keep guards in position, and check for function. If they do not function, summon the instructor.
4. Keep blade exposure to a minimum.
5. Keep hands and fingers six inches away from the blade when sawing.
6. Do not make any adjustments while the saw is in operation.
7. Be aware of kickback caused by binding of the blade.
8. Thigh injuries can easily occur when your cut is completed; keep legs clear.
9. Do not operate machine in out of balance position.
10. Use only three-pronged grounded plugs and do not string extension cords across aisles.
11. Do not operate in wet or damp areas, and be aware of cutting the power cord.
12. Do not pass or hand the saw to another person unless the power cord is disconnected.
13. Secure the work piece if possible, and be aware of falling cut-off stock.
14. Do not lay the machine down until it has reached a dead stop.
15. Clean up area and return machine to proper storage.

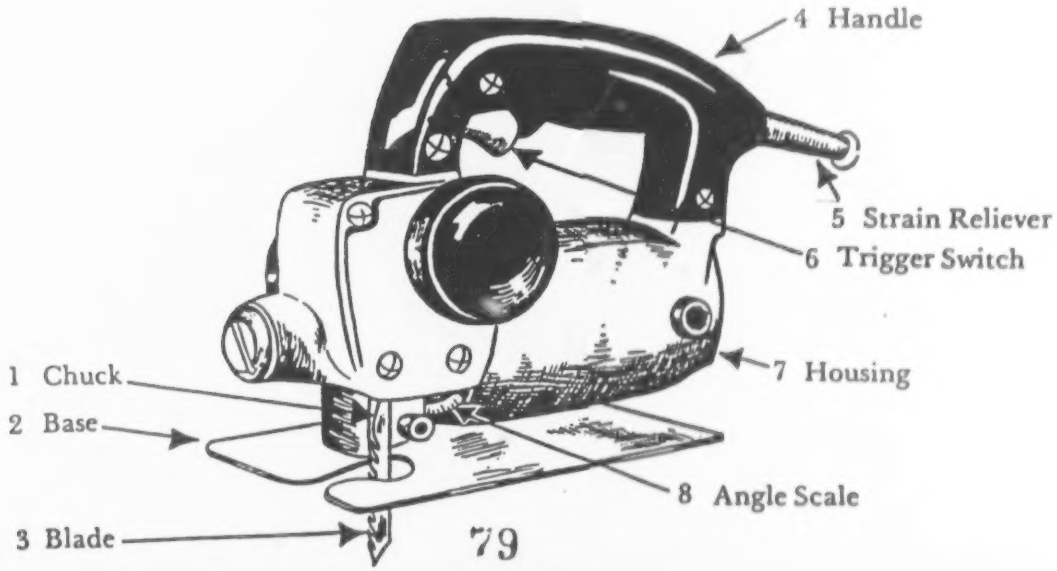
PORTABLE ELECTRIC SAW


1 Trigger Switch
5 Handle
2 Guard Lift Handle
6 Angle Scale
7 Tilt Lock Knob
3 Retractable Guard
4 Blade
8 Tilting Base

6.16 SAFETY RULES FOR BAYONET SAW

1. Wear safety glasses.
2. Do not use extension cord without a three-prong grounded plug, and do not string cord across the aisle.
3. Do not operate the bayonet saw in out of balance position.
4. Do not operate the saw in damp or wet areas.
5. Do not lay the saw down until it has reached a dead stop.
6. Make sure the blade is the correct type for the material and that it is tightly clamped in the chuck. Adjust speed for material to be cut.
7. Be sure the switch is off before connecting the power source.
8. Use vise or clamps to securely hold material to be cut.
9. Keep cutting pressure constant. Do not force the blade into the work.
10. Always keep the base tightly against the material being cut.
11. If blade is in the saw, be sure and lay the saw on its side.
12. Store saw in proper box or container.

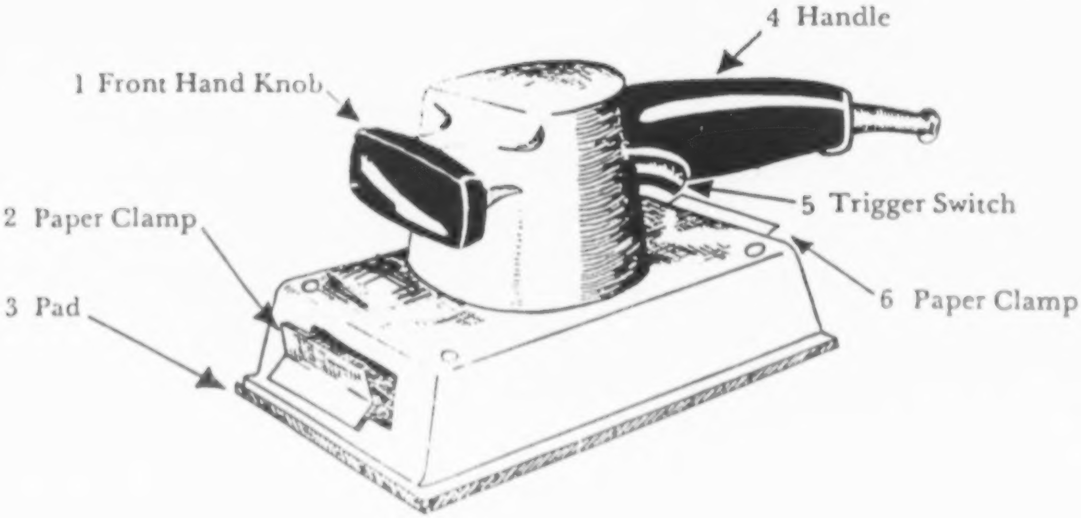
BAYONET SAW



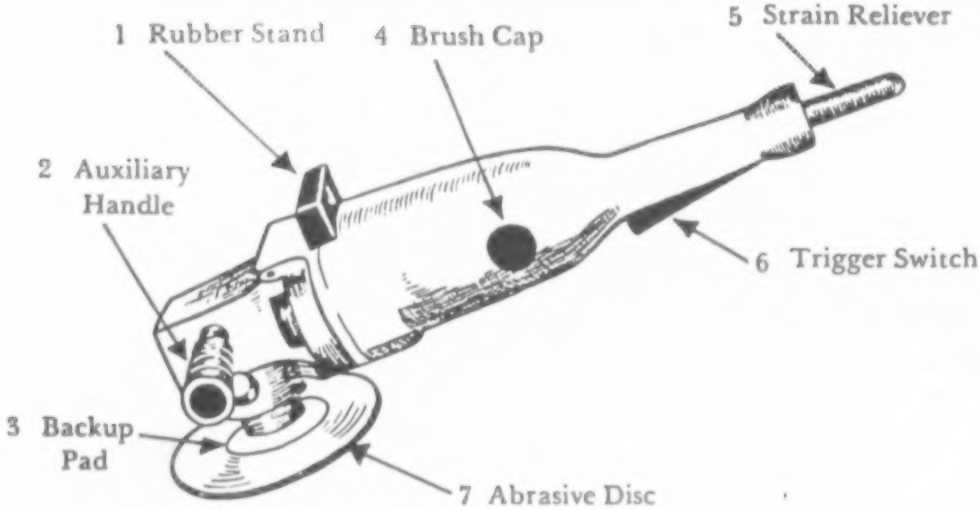
6.17 SAFETY RULES FOR SANDERS (PORTABLE) & DISC GRINDERS

1. Always wear proper eye protection.
2. Secure work piece; objects can be thrown if not securely mounted.
3. Inspect the sander belt, disc, or wheel for damage.
4. Before plugging in the electrical cord, make certain that the switch is off and that the belt, disc, or wheel is not touching the work bench. Use only three-prong grounded plug.
5. Do not operate the machine in wet or damp areas.
6. Do not force the sanders; use only the weight of the machine.
7. Avoid inhaling dust. Use adequate ventilation and a respirator if necessary.
8. Do not lay the machine down until it has reached a dead stop.
9. Do not string extension cords across aisles.
10. Keep hands clear of belt, disc, and wheel; they can cause serious cuts and abrasions.
11. Be extremely cautious of letting electrical cords and loose clothing get caught in these machines.
12. Be aware of other people when sanding or grinding metal. Metal sparks and abrasive material can be thrown a great distance. (Use a barrier shield.)
13. Disconnect cord and return tools and equipment to proper storage.
14. Clean up the area when the operation is completed.

PORTABLE SANDER


1 Front Hand Knob
2 Paper Clamp
3 Pad
4 Handle
5 Trigger Switch
6 Paper Clamp

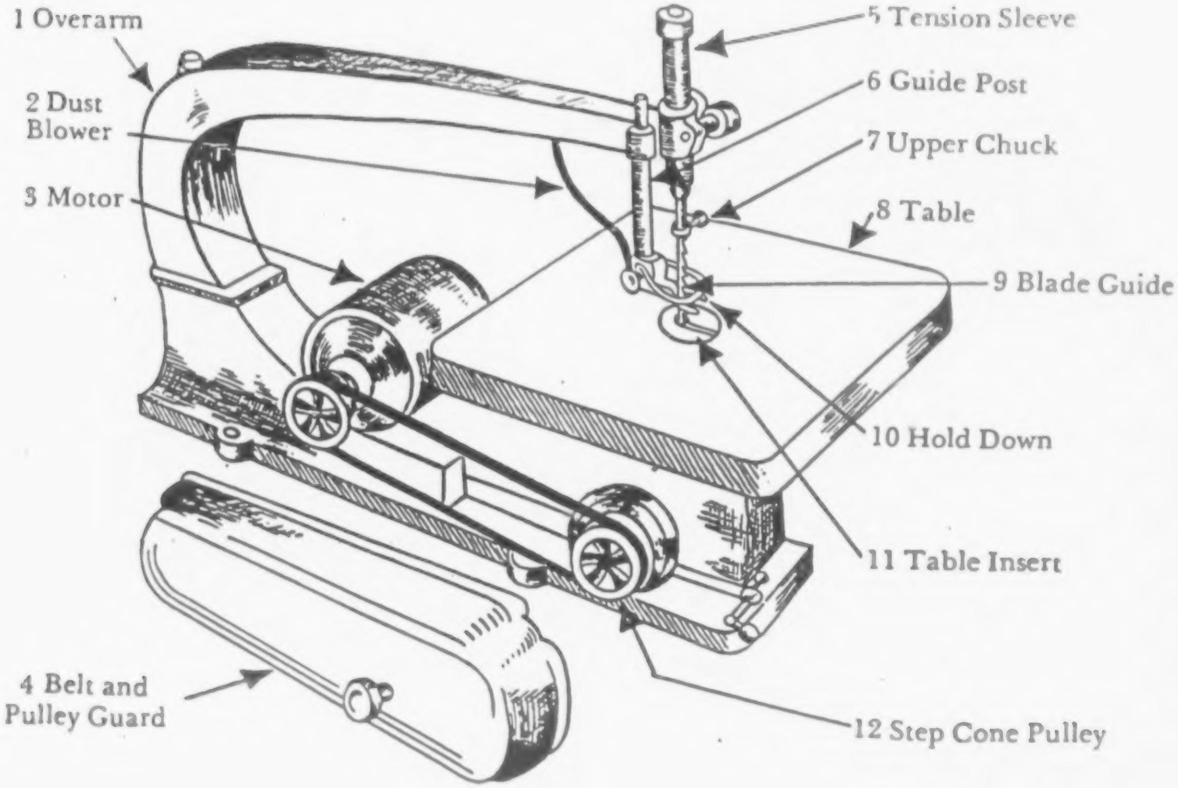
DISC GRINDER


1 Rubber Stand
4 Brush Cap
5 Strain Reliever
2 Auxiliary Handle
6 Trigger Switch
3 Backup Pad
7 Abrasive Disc

6.18 SAFETY RULES FOR THE SCROLL SAW (JIG)

1. Wear safety glasses.
2. Make all adjustments before applying power.
3. Stock to be cut should have one flat side for placing against the table.
4. Check blade for size, type, direction, and tension.
5. Adjust the hold-down so that the spring fingers bear lightly on the work.
6. Set the blade speed as instructed if it is a variable speed machine.
7. Adjust the dust blower if the machine is so equipped.
8. Allow machine to reach full speed before cutting.
9. Do not overload the machine by feeding too fast.
10. Do not pass fingers within four inches of the blade.
11. Keep hands and fingers in a position where there is no danger of them slipping into the blade; hold work piece on either side of the cutting line.
12. Have instructor check special operations.
13. Avoid pinching the blade by turning too sharply.
14. If blade breaks or hangs, shut off the machine and call the instructor. Do not touch the blade.
15. Allow the machine to reach a dead stop before removing scrap stock.
16. Return all adjustments to "normal."
17. Do not leave the machine until it has reached a dead stop.
18. Make all adjustments before turning on scroll saw.

SCROLL SAW

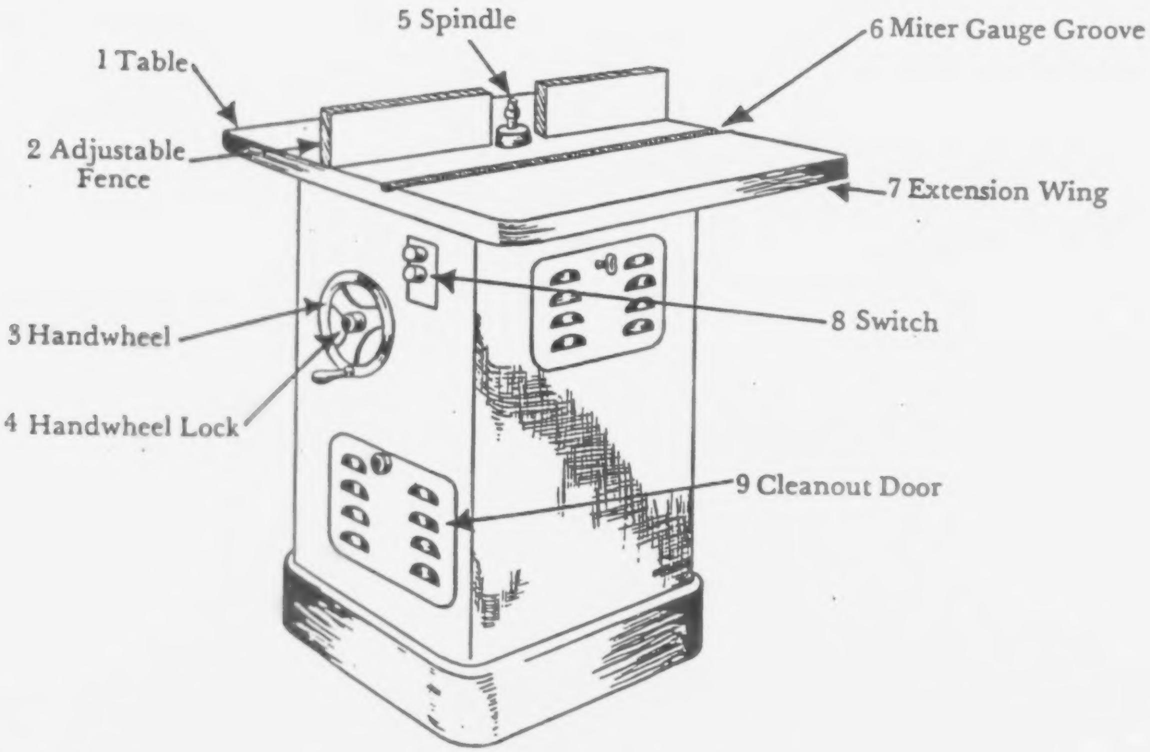

1 Overarm
2 Dust Blower
3 Motor
4 Belt and Pulley Guard
5 Tension Sleeve
6 Guide Post
7 Upper Chuck
8 Table
9 Blade Guide
10 Hold Down
11 Table Insert
12 Step Cone Pulley

6.19 SAFETY RULES FOR THE WOOD SHAPER

1. Do not attempt any shaper operation without the direct supervision of the instructor.
2. Wear safety glasses.
3. Make all adjustments with machine at a dead stop.
4. Sharpen and hone cutters before using them if needed.
5. Do not attempt to shape work having cracks, knots or other defects.
6. When changing cutters, disconnect power.
7. Make certain that the wood is fed opposite to the direction of cutter rotation.
8. Maintain a well-balanced position at all times.
9. Be sure that the knives are correctly seated and that the locknut is tight.
10. Do not attempt to shape small or thin stock without special holding jigs.
11. Use the spring guard, fence, or fixed collar.
12. Never move your hand or fingers past or over the cutting head.
13. Allow machine to reach full speed before shaping.
14. Use a push stick and feather board as needed.
15. Test setup on scrap stock of a safe size.
16. Hold the stock firmly and feed at a moderate speed--not too fast or so slow as to burn the wood.
17. Backing up on deep cuts can be extremely dangerous.
18. Allow machine to reach a dead stop; then clean up the area.
19. Do not leave the machine until it has reached a dead stop.

20. Use three-wing one piece cutters whenever possible.
21. Always use a starting pin for free hand shaping.
22. Use the smallest table insert possible.

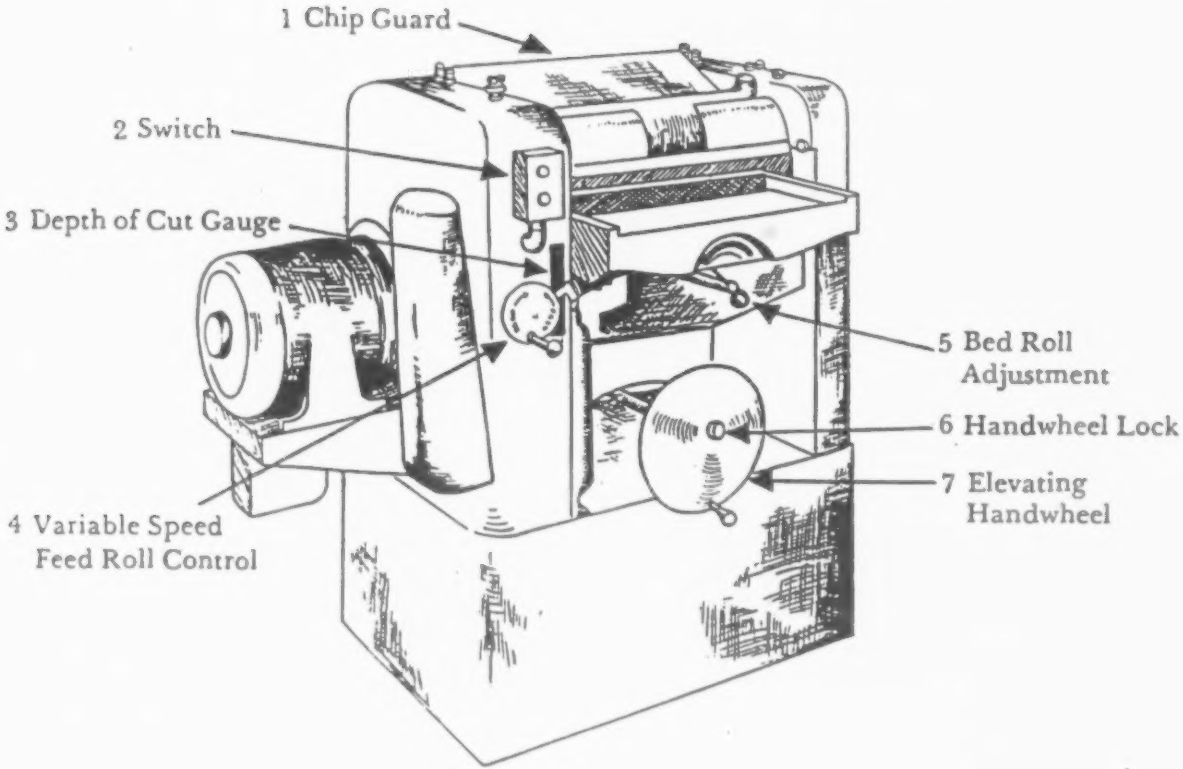
WOOD SHAPER


5 Spindle
6 Miter Gauge Groove
1 Table
2 Adjustable Fence
7 Extension Wing
8 Switch
3 Handwheel
4 Handwheel Lock
9 Cleanout Door

6.20 SAFETY RULES FOR THE SURFACE PLANER

1. Wear safety glasses.
2. Use only clean, nail-free lumber.
3. Plane no board that is less than 14-inches long and 1/4-inch thick.
4. Make adjustments only when the machine is stopped, with the exception of normal depth of cut adjustments between passes.
5. A normal cut should be 1/32- to 1/16-inch and a maximum cut of 1/8-inch on soft material.
6. Make sure exhaust system is on and operating correctly before surface planing. Shut off when finished.
7. Allow machine to reach full speed before feeding stock.
8. When feeding and receiving, stand to one side and never look into the throat of the machine while it is running.
9. Keep hands clear of the table and boards that have been gripped by the feed rolls.
10. Never change depth of cut adjustment while a board is in the surface planer.
11. If a board hangs in the machine, shut off the power and summon the instructor. Do not reach into the machine throat.
12. Loose knots should be removed before planing.
13. Allow ample drying time for glue jobs. Generally 24 hours is adequate. Check time requirements for type of adhesive used.
14. Return all adjustments to "normal" and clean up the area.
15. Do not leave the machine until it reaches a dead stop.
16. Obtain assistance for long pieces of stock.
17. End grain planing is NOT RECOMMENDED.

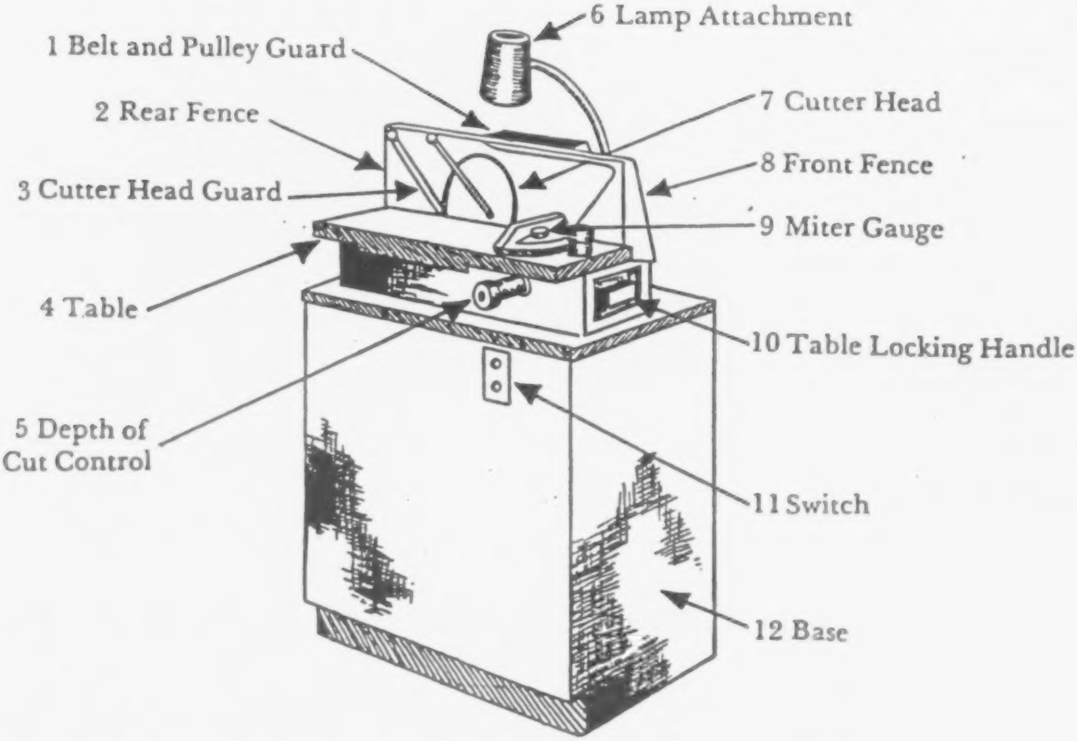
SURFACE PLANER


1 Chip Guard
2 Switch
3 Depth of Cut Gauge
4 Variable Speed Feed Roll Control
5 Bed Roll Adjustment
6 Handwheel Lock
7 Elevating Handwheel

6.21 SAFETY RULES FOR THE UNIPLANE

1. Wear safety glasses.
2. Make all adjustments before applying power.
3. Make sure all guards are in place and operating correctly.
4. Always use push block when working with small material.
5. Continue moving the work piece past the cutter head until it is resting against the rear fence.
6. Do not brush chips or dust away from the point of operation until the machine has come to a full stop.
7. Feed stock slowly while holding it firmly against the table and fence.
8. Push stock far enough on each pass to allow guard to drop.
9. Allow the machine to come to a dead stop before leaving it.
10. Return all adjustment to"normal" and clean up the area.
11. Make sure cutters are securely held in the cutter head.
12. Keep cutter head free from all gum or pitch.
13. The guard must be clean and slide freely. If should not be clamped in the up position.
14. Always check material for nails, loose knots or rocks.

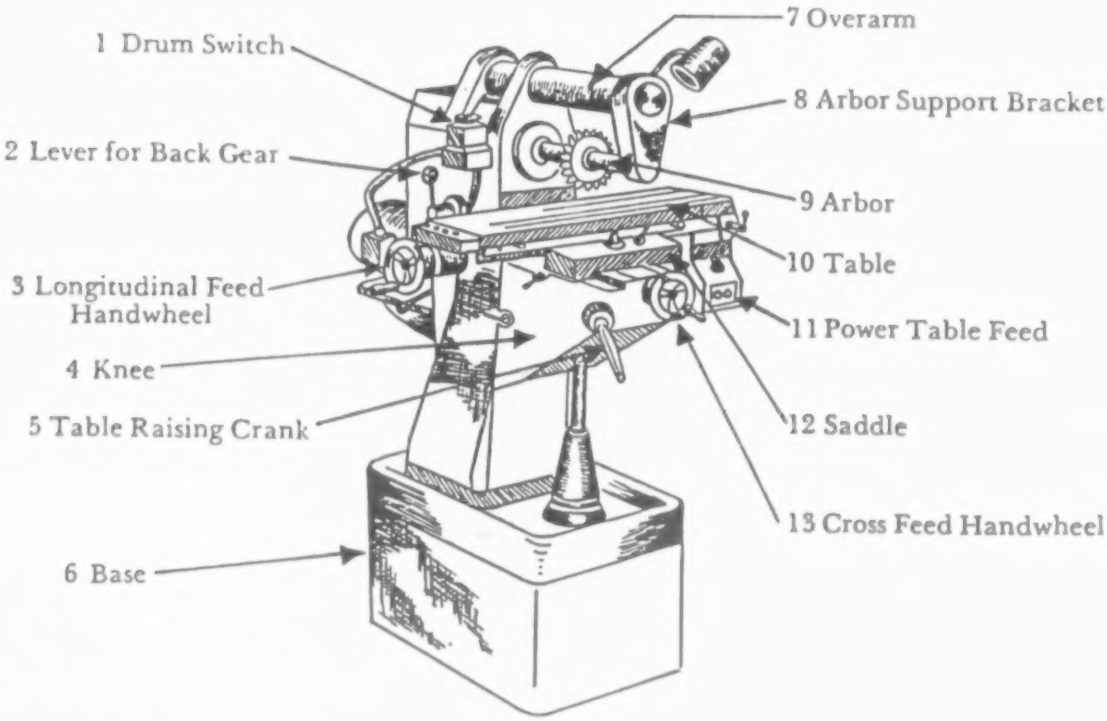
UNIPLANE


6 Lamp Attachment
1 Belt and Pulley Guard
7 Cutter Head
2 Rear Fence
8 Front Fence
3 Cutter Head Guard
9 Miter Gauge
4 Table
10 Table Locking Handle
5 Depth of Cut Control
11 Switch
12 Base

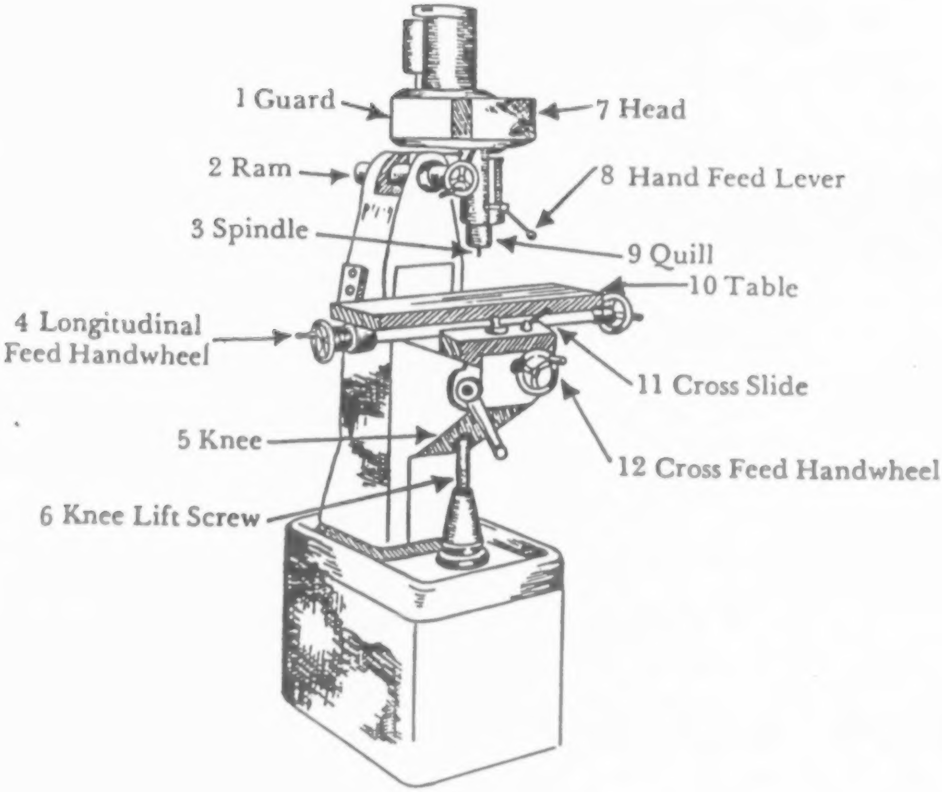
6.22 SAFETY RULES FOR THE MILLING MACHINE (HORIZONTAL & VERTICAL)

1. Wear safety glasses.
2. Make adjustments and measurements only when the machine is at a dead stop.
3. Mount the work piece securely in the holding device.
4. Make sure the cutter is rotating in the right direction. Feed against the cutter unless the machine is capable of climb cutting.
5. Handle cutters carefully. They are extremely sharp.
6. Keep hands and fingers a minimum of six inches away from the cutter. Do not reach across cutters.
7. The instructor MUST approve your setup.
8. Do not lay tools on the machine.
9. Check and set up proper speed, feed, and depth of cut.
10. Use proper type and amount of coolant.
11. Disengage handles when operating on automatic feed.
12. Take care to prevent jamming the machine, saddle, or work into the column, cutter, etc.
13. Do not leave the machine until it has reached a dead stop.
14. Allow the machine to reach a dead stop; then clean up the area, using a brush to remove chips. Do not use a rag or compressed air.
15. Return machine to normal, and return cutters and other equipment to their proper storage place.

HORIZONTAL MILLING MACHINE


1 Drum Switch
2 Lever for Back Gear
3 Longitudinal Feed Handwheel
4 Knee
5 Table Raising Crank
6 Base
7 Overarm
8 Arbor Support Bracket
9 Arbor
10 Table
11 Power Table Feed
12 Saddle
13 Cross Feed Handwheel

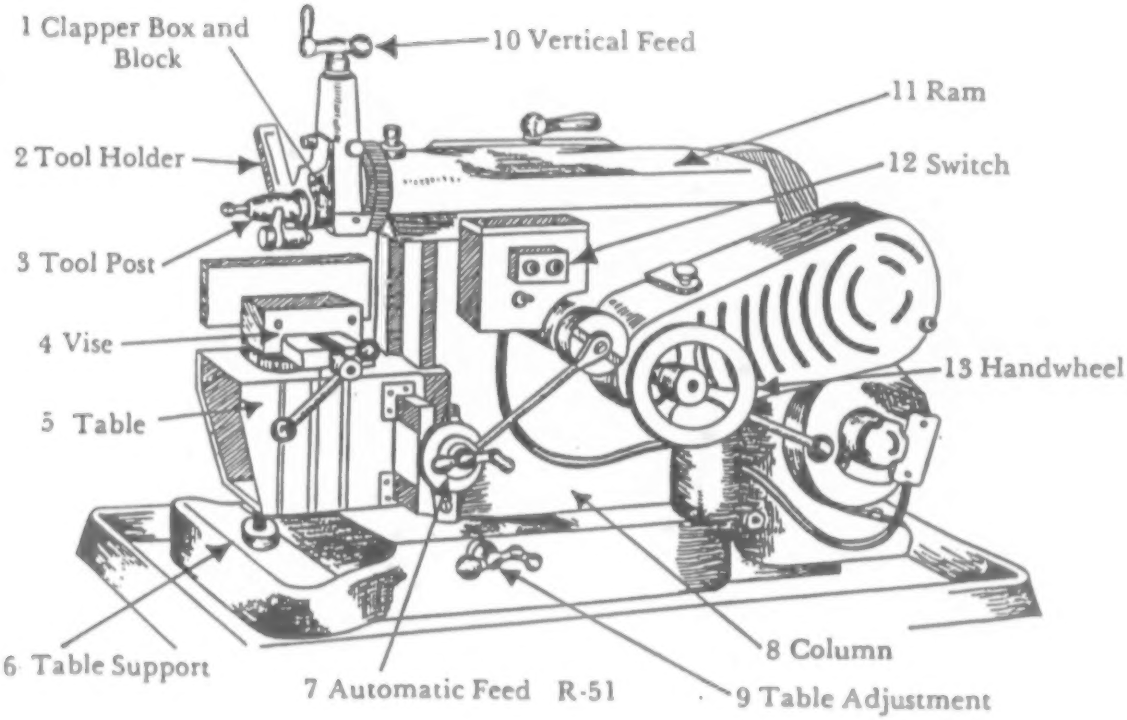
VERTICAL MILLING MACHINE


1 Guard
7 Head
2 Ram
8 Hand Feed Lever
3 Spindle
9 Quill
10 Table
4 Longitudinal Feed Handwheel
11 Cross Slide
5 Knee
12 Cross Feed Handwheel
6 Knee Lift Screw

6.23 SAFETY RULES FOR THE METAL SHAPER

1. Wear safety glasses.
2. Make adjustments and measurements only when the machine is at a dead stop.
3. Securely mount the work piece in the holding device.
4. Make certain that the ram and the head will clear the work and holding devices.
5. Check and set the cutting speed, feed, and depth of cut.
6. Keep hands and fingers a minimum of six inches from the cutting tool and all other moving parts.
7. Do not lay tools on the machine.
8. Do not stand directly in front of the ram.
9. The instructor MUST approve the setup.
10. Do not leave the machine until it has reached a dead stop.
11. Do not remove chips while the machine is in motion.
12. Allow the machine to reach a dead stop; then clean up the area. Use a brush (not a rag or compressed air) for removing chips.
13. Return the machine to normal and return all tools and equipment to the proper storage place.
14. When adjusting a part, remove the adjusting handle at the same time removing hand.

METAL SHAPER

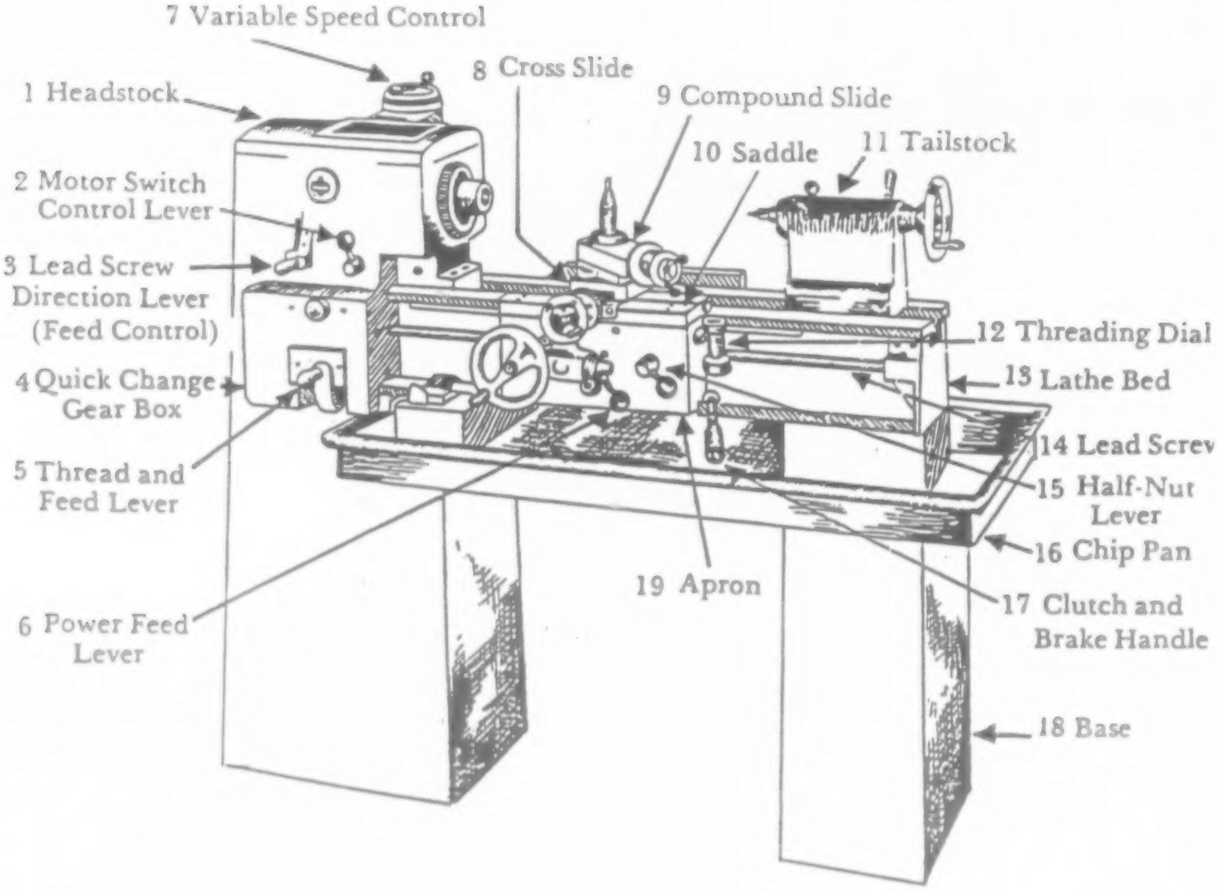

1 Clapper Box and Block
10 Vertical Feed
11 Ram
2 Tool Holder
12 Switch
3 Tool Post
4 Vise
13 Handwheel
5 Table
6 Table Support
7 Automatic Feed
R-51
8 Column
9 Table Adjustment

6.24 SAFETY RULES FOR THE METAL LATHE

1. Wear safety glasses.
2. Make adjustments and measurements only when the machine is at a dead stop.
3. Use proper techniques for removing tool bits from the tool holder.
4. Have the instructor check your setup.
5. Use only proper ground tools set on center of work place.
6. Make sure that tail stock, tool bit, and tool post are properly tightened.
7. Do not lay tools or stock on machine.
8. Use proper support for turning long stock.
9. Check clearances before applying power; turn machine through one complete cycle by hand.
10. Use cradle to board when removing or installing checks and face plates.
11. Check work piece to see if it is securely mounted.
12. Chatter indicates something is wrong. Stop machine and check set up, tool bit, etc.
13. Do not leave the chuck wrench in the chuck at any time.
14. Do not touch chips; they can cause severe cuts and burns.
15. Allow machine to reach a dead stop before reversing rotation.
16. Remove tool holder and tool post for filing and polishing; use extreme caution during these operations.
17. Keep hands at side or on controls when operating.
18. Do not leave the machine until it has reached a dead stop.
19. Clean up machine and area. Use a brush (not a rag or compressed air) for removing chips.

20. Return machine to normal and return all tools and equipment to the proper storage place.

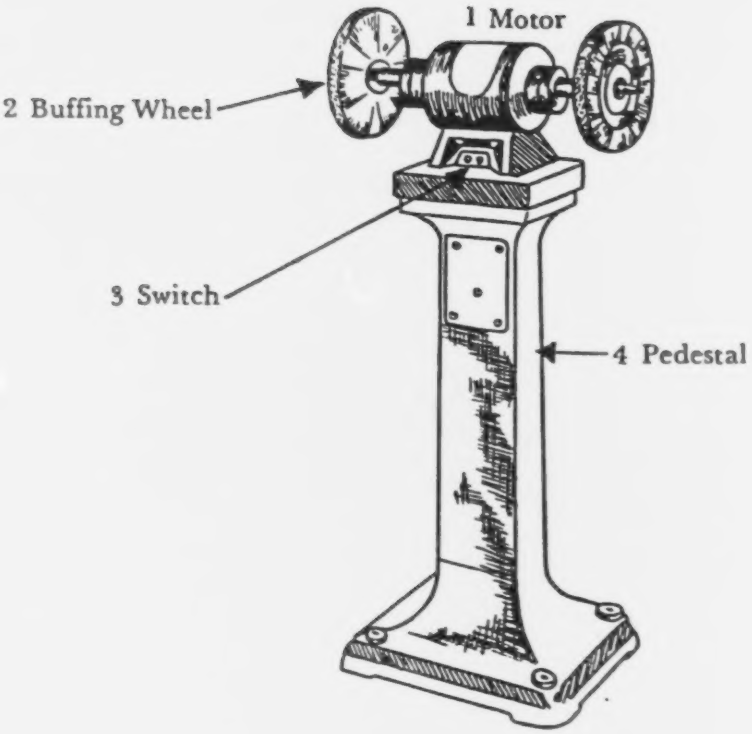
METAL LATHE


7 Variable Speed Control
8 Cross Slide
1 Headstock
9 Compound Slide
10 Saddle
11 Tailstock
2 Motor Switch Control Lever
3 Lead Screw Direction Lever (Feed Control)
12 Threading Dial
4 Quick Change Gear Box
13 Lathe Bed
14 Lead Screv
5 Thread and Feed Lever
15 Half-Nut Lever
16 Chip Pan
19 Apron
6 Power Feed Lever
17 Clutch and Brake Handle
18 Base

6.25 SAFETY RULES FOR BUFFING MACHINES

1. Wear safety glasses and face shield.
2. Make certain wheel guards are in place.
3. Make all adjustments with the machine at a dead stop.
4. Apply compound sparingly.
5. Keep hands away from the wheel while it is in motion.
6. Hold on firmly to the article being buffed.
7. To prevent it from being grabbed from your hands, never present top edge to the buffing wheel.
8. Decide on the steps of procedure before attempting to buff.
9. Buff on the lower portion of the wheel (below center).
10. Press material against wheel with only sufficient pressure to cause wheel to polish the material.
11. Turn off power after using the machine.
12. Use extra caution when buffing corners or confined areas of the work.

BUFFER


1 Motor
2 Buffing Wheel
3 Switch
4 Pedestal

6.26 SAFETY RULES FOR BANDSAW (HORIZONTAL) AND OTHER CUTOFF SAWS

1. Wear safety glasses.

2. Mount or remove work only when the saw is stopped and is raised well above the vise.

3. Clamp the work piece securely on both sides of the blade if possible.

4. Use only blades that are in good condition and which are the correct kind for the material being cut.

5. Operate the machine at a cutting speed and feed rate that does not strain the machine or the blade.

6. Keep hands away from the saw blade when it is running.

7. Stand out of line with the blade when starting an abrasive cutoff saw.

8. Do not bend over in front of a power hack saw frame when the machine is running.

9. Support long pieces of stock so that they will not fall and cause injury and hang a cloth on the protruding ends to warn others of the potential hazard to them.

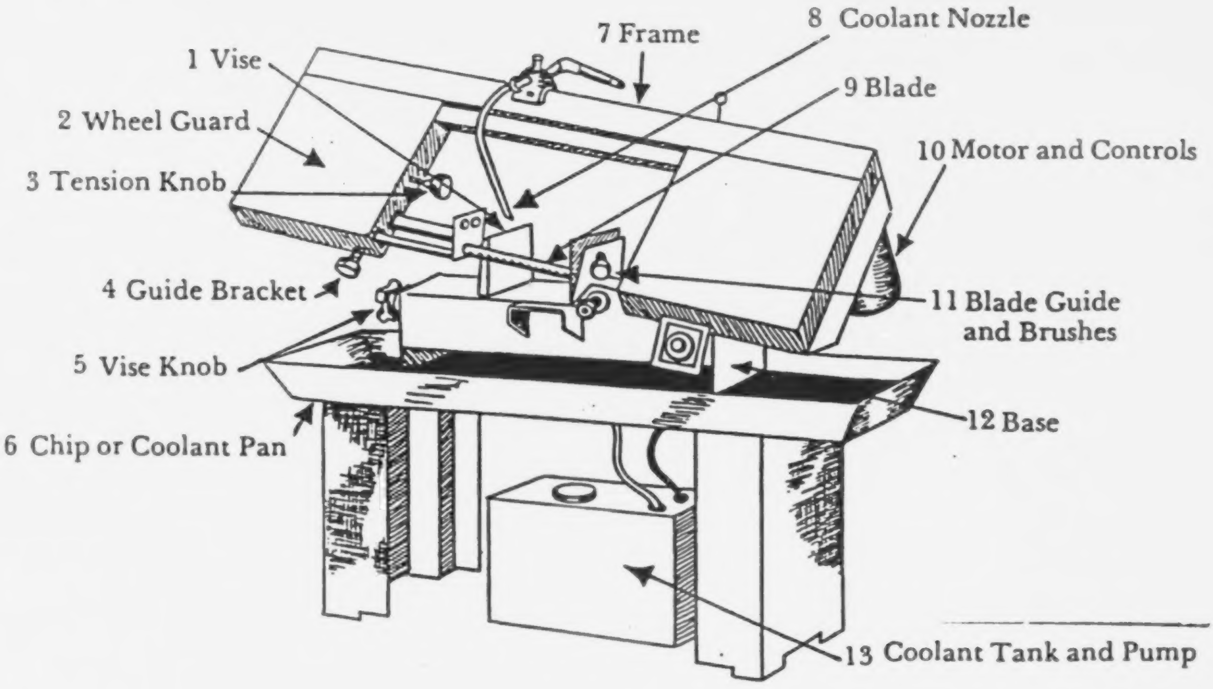
10. Broken blades can result on power hacksaws with hydraulic feeds if blades are brought closer to the work piece than 6mm (1/4") at the start of a cut.

11. Take due care when handling freshly cut pieces. They have sharp edges and can be hot enough to cause burns.

12. If the material requires coolant, be sure the system is working and the correct coolant is being used.

HORIZONTAL BANDSAW

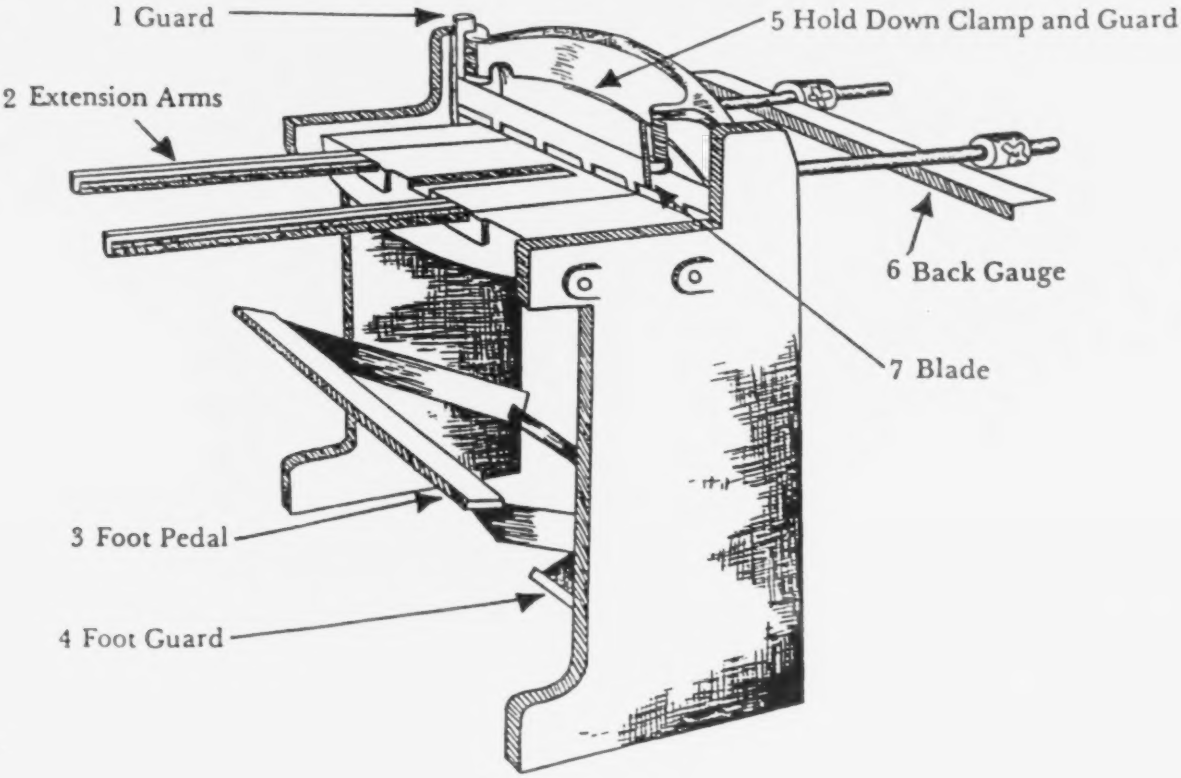
coolant is used.


1 Vise
2 Wheel Guard
3 Tension Knob
4 Guide Bracket
5 Vise Knob
6 Chip or Coolant Pan
7 Frame
8 Coolant Nozzle
9 Blade
10 Motor and Controls
11 Blade Guide and Brushes
12 Base
13 Coolant Tank and Pump

6.27 SAFETY RULES FOR THE SQUARING SHEAR

1. Wear safety glasses.
2. Check setup and machine before operating.
3. Adjust the guard.
4. Do not surpass the capacity of the machine.
5. Feed and operate from the front or the operator's position.
6. Keep the foot not being used out from under the treadle.
7. Always keep your hands and fingers away from the pressure bar and blade--a minimum of four inches.
8. Allow small pieces to drop; do not attempt to catch them.
9. Remove burrs before working; gloves or pads are recommended for handling sheet metal.
10. If power operated, make certain that the work piece is securely clamped and that both hands are clear before applying power.
11. Place scraps or trimmings in metal waste container and return machine to normal.
12. If power operated, allow the machine to reach a dead stop before leaving.
13. Keep blades sharp.
14. Cut only sheet metal, never round rods or wire.

SHEET METAL SQUARING SHEAR


1 Guard
2 Extension Arms
3 Foot Pedal
4 Foot Guard
5 Hold Down Clamp and Guard
6 Back Gauge
7 Blade

6.28 SAFETY RULES FOR WELDING (ARC)

1. Wear approved welding helmet or face shield of the proper shade. Do not use gas welding goggles for arc welding.

2. Do not use a helmet that has a cracked or chipped filter lens.

3. Wear appropriate clothing--long-sleeved shirts, gauntlet gloves, and boots or leggings. Cover all skin from the arc rays and sparks.

4. Wear safety glasses during all chipping; wear glasses under helmet if doing intermittent chipping.

5. Do not wear synthetic clothing that is highly flammable (rayons, nylons, etc.) and do not wear trousers with turned up cuffs.

6. Do not carry matches, cigarette lighters, plastic combs, or pens in pockets.

7. Do not breathe fumes; make certain that the exhaust system is operating.

8. Treat all metal, tools, tables, and equipment as if they were hot; pat before picking up.

9. Clear area of combustible materials.

10. Report any malfunction of machine to the instructor (hot leads, electric shorts, noises, etc.).

11. Take care to prevent arc flashing other people. Use barrier shields, and warn others in area before striking an arc.

12. Do not weld on fuel tanks, cans, barrels, or any closed containers.

13. Hang up electrode holder. Do not lay it on bench, work piece, or welding machine.

14. Be careful of others when welding and chipping.

15. Do not allow rod ends to get on the floor; place in scrap metal containers.

16. Keep all gas welding tanks out of cord reach of arc welder.

6.29 SAFETY RULE FOR GAS ARC WELDING (TIG AND MIG)

1. Wear No. 2 flash goggles with side shields under an approved helmet containing a No. 12 or No. 14 lens. Ultraviolet rays from this type of welding are about two times as strong as with a flux arc welder.

2. Have adequate ventilation because of ozone, carbon dioxide, and other gases.

3. All skin surfaces must be covered. Do not wear light-colored clothing, as it will reflect too much light behind the helmet.

4. Do not use if floor is wet or damp. Report water leaks on machine and on torch or gun.

5. Wool or leather protective clothing is recommended. Cotton is rapidly deteriorated by the arc rays. Do not wear trousers with turned-up cuffs.

6. Make certain that the regulator pressure screw is released or that the flow-meter valve is closed before opening the cylinder valve.

7. Use the proper connections for connecting regulators and hose to the cylinder. They will vary according to type of gas used carbon dioxide, argon, etc.). When replacing, check for leaks before using.

8. Care should be taken never to have a common ground on metal gas arc welding (MIG) and tungsten gas arc welding (TIG).

9. Do not wear synthetic clothing that is highly flammable.

10. Carry no matches, cigarette lighters, plastic combs, or pens in pockets.

11. Treat metal, tools, tables, and equipment as if they were hot; pat before picking up.

12. Clear area of combustible materials.

13. Use extreme caution to prevent an arc from flashing into peoples' eyes. Use a barrier shield.

14. Report any malfunction of the machine to the instructor (overheating of gun or torch, wire stoppage, etc.).

15. Do not weld on fuel tanks, cans or barrels.

16. Hang up gun or torch; do not lay on table, work piece, or machine.

17. Use pliers for handling hot materials--not gloves.

18. Be careful of electrical shock between gun and torch and table, work, or ground lead.

19. Do not leave machine without turning off power, gas, and water supply.

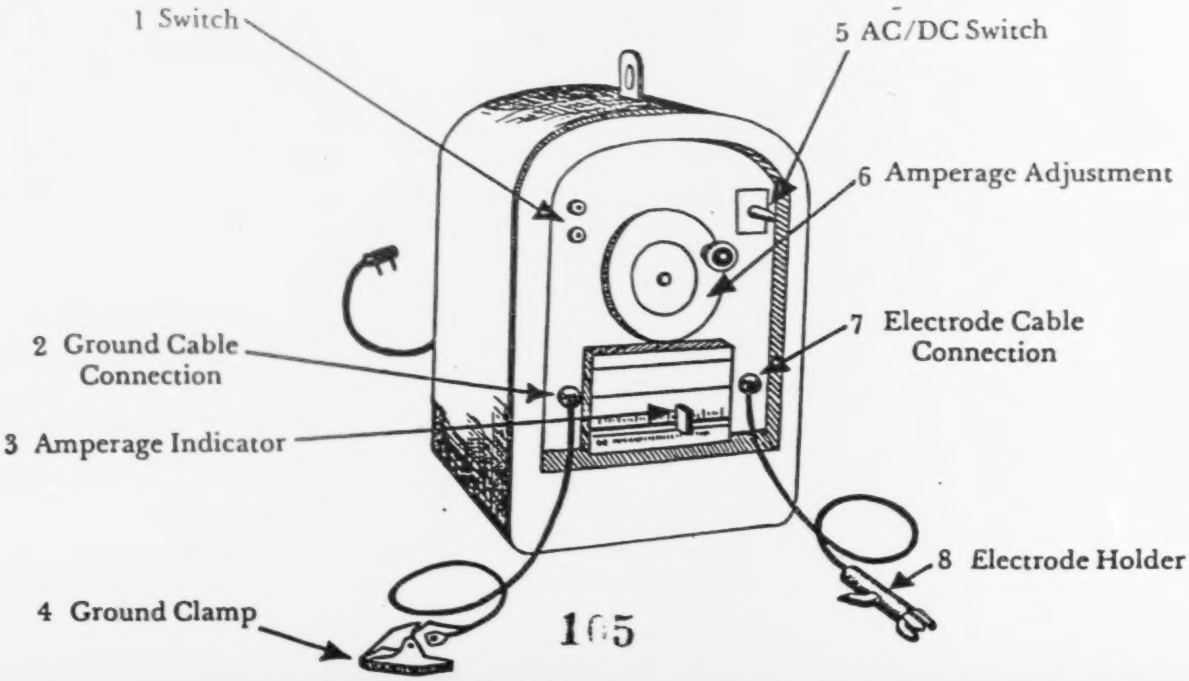
20. Make certain that the gas cylinders are chained or secured; screw on bottle cap for storage or moving.

21. Keep regulator or glow meter and all other connections free of oil and grease. Some gas mixtures contain oxygen.

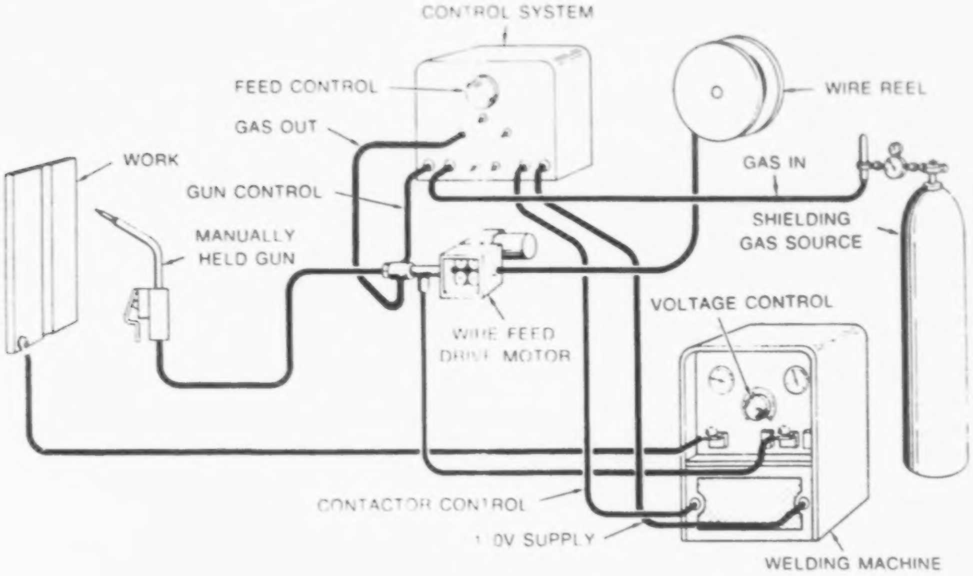
22. Close cylinder valve; shut off water and electricity; return all equipment to its proper storage place.

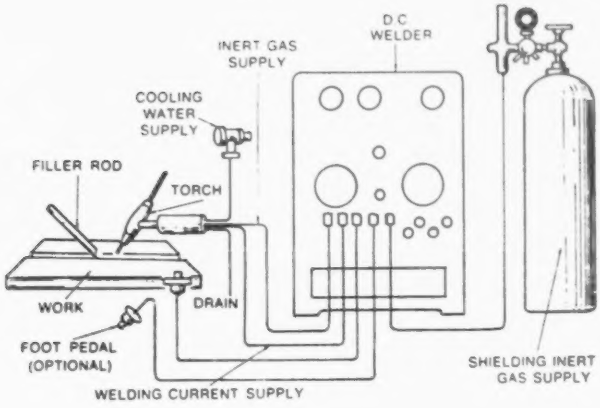
23. Clean up the area.

ARC WELDER


1 Switch
5 AC/DC Switch
6 Amperage Adjustment
7 Electrode Cable Connection
2 Ground Cable Connection
3 Amperage Indicator
8 Electrode Holder
4 Ground Clamp

TIG AND MIG WELDER

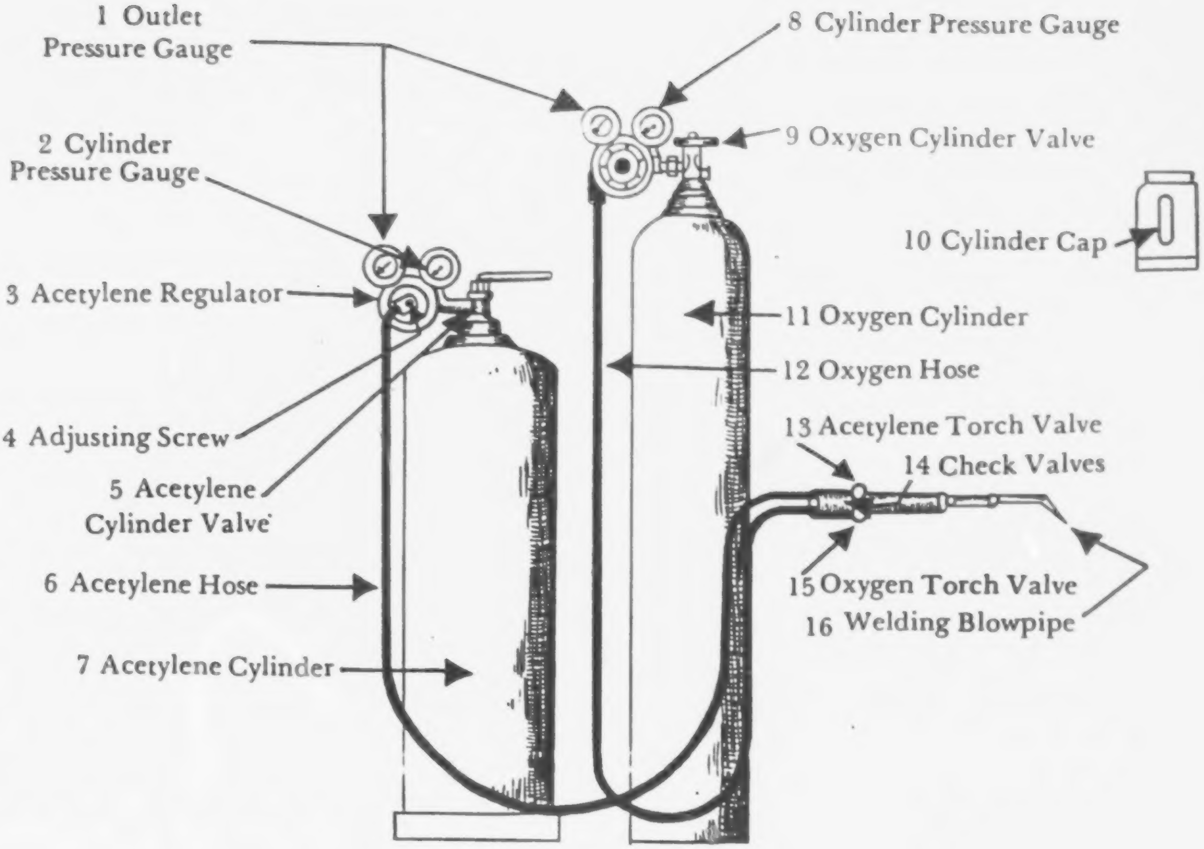

CONTROL SYSTEM
FEED CONTROL
WIRE REEL
GAS OUT
WORK
GAS IN
GUN CONTROL
SHIELDING GAS SOURCE
MANUALLY HELD GUN
VOLTAGE CONTROL
WIRE FEED DRIVE MOTOR
CONTACTOR CONTROL
110V SUPPLY
WELDING MACHINE


D.C. WELDER
INERT GAS SUPPLY
COOLING WATER SUPPLY
FILLER ROD
TORCH
WORK
DRAIN
FOOT PEDAL (OPTIONAL)
WELDING CURRENT SUPPLY
SHIELDING INERT GAS SUPPLY

6.30 SAFETY RULES FOR THE OXYACETYLENE WELDING

1. Wear approved welding goggles or face shield of the proper shade.
2. Inspect the equipment before using. Make certain cylinders are chained or restrained by some other means. Inspect hoses, valves, and connections; report any defects to the instructor.
3. Before storing or moving cylinders, screw on the protective cap.
4. Keep equipment clean and free of oil and grease. Never oil or grease any part.
5. Make sure that ventilation is adequate; do not breathe fumes.
6. Wear appropriate clothing and gloves. Do not wear new synthetic clothing that is extremely flammable or trousers with turned up cuffs.
7. Do not carry matches, cigarette lighters, plastic combs, or pens in pockets.
8. Report any malfunction of the equipment to the instructor.
9. Do not allow rod ends to get on the floor; place them in the scrap metal containers.
10. Use pliers for picking up hot metals--not gloves.
11. Be careful of steam burns when quenching hot metal.
12. Always release regulator pressure screws before opening cylinder valves; stand to one side and open valves slowly.
13. Turn the oxygen cylinder valve wide open.
14. Open acetylene cylinder valve 1/4 to 1/2 turn. Leave handle in place on the valve for quick closing.
15. A hammer or wrench should not be used to open cylinder valves.
16. Do not allow oil to come in contact with hoses or equipment.

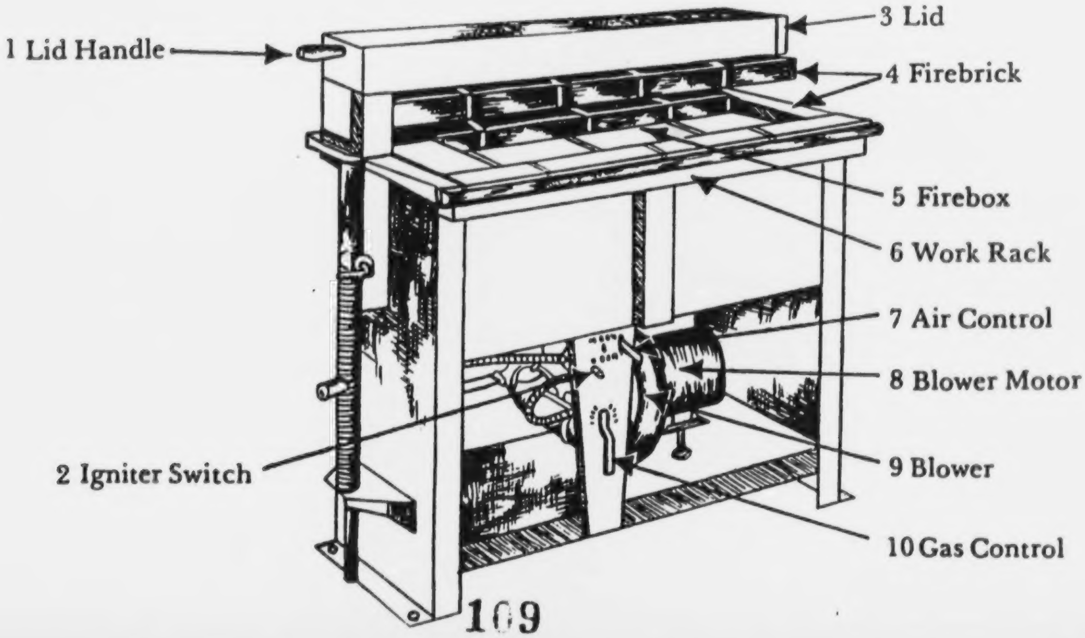
OXYACETYLENE WELDER


1 Outlet Pressure Gauge
2 Cylinder Pressure Gauge
3 Acetylene Regulator
4 Adjusting Screw
5 Acetylene Cylinder Valve
6 Acetylene Hose
7 Acetylene Cylinder
8 Cylinder Pressure Gauge
9 Oxygen Cylinder Valve
10 Cylinder Cap
11 Oxygen Cylinder
12 Oxygen Hose
13 Acetylene Torch Valve
14 Check Valves
15 Oxygen Torch Valve
16 Welding Blowpipe

6.31 SAFETY RULES FOR THE GAS FORGE

1. Operate only with instructor's permission and after receiving instruction.
2. Remove jewelry, eliminate loose clothing, and confine long hair.
3. Make sure all guards are in place and operating correctly.
4. Always use proper eye protection.
5. Fireproof mittens (gloves) must be worn when the tongs cannot be used.
6. A pail of water should be nearby at all times.
7. Hot metal should be marked "HOT" with chalk.
8. The top must be open when lighting the forge.
9. When shutting down, the gas control should be turned off first.
10. Be sure gas if off "tight" when leaving the forge.

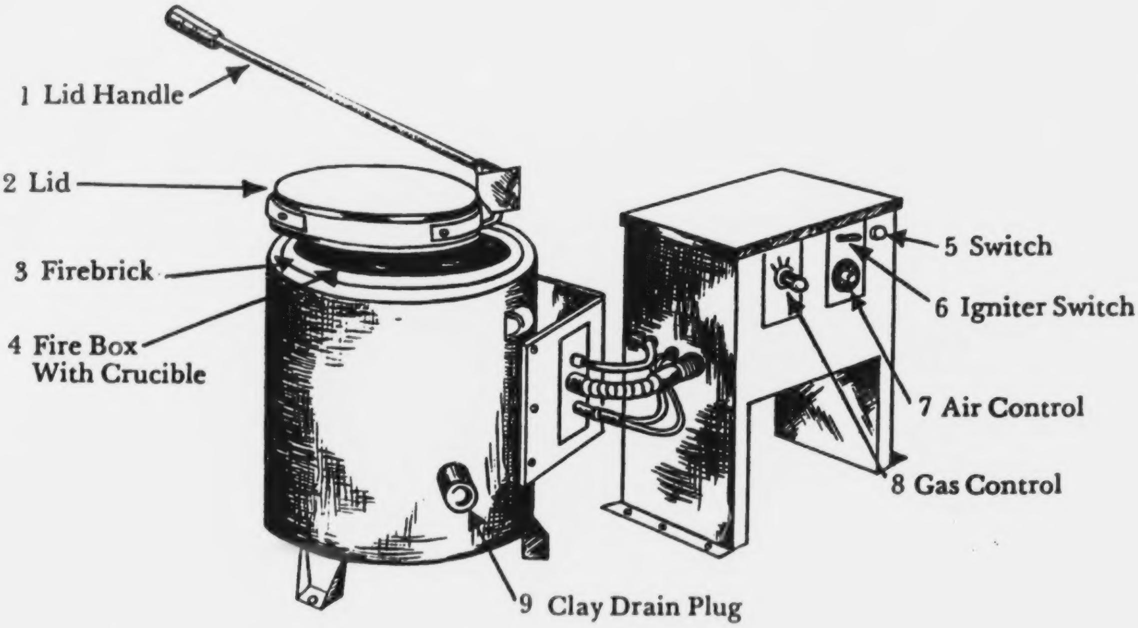
GAS FORGE


1 Lid Handle
2 Igniter Switch
3 Lid
4 Firebrick
5 Firebox
6 Work Rack
7 Air Control
8 Blower Motor
9 Blower
10 Gas Control

6.32 SAFETY RULES FOR THE CRUCIBLE FURNACE

1. Operate only with instructor's permission and after receiving instructions.
2. Remove jewelry, eliminate loose clothing, and confine long hair.
3. Make sure all guards are in place and operating correctly.
4. Always use proper eye protection.
5. Protective clothing must be worn (coat, gloves, face shield, shoes, and leg protectors).
6. Do not throw metal in crucible, use tongs.
7. When pouring, keep metal close to the floor and move slowly.
8. Do not step on metal spilled on the floor.
9. Be sure to pin crucible in pouring cradle.

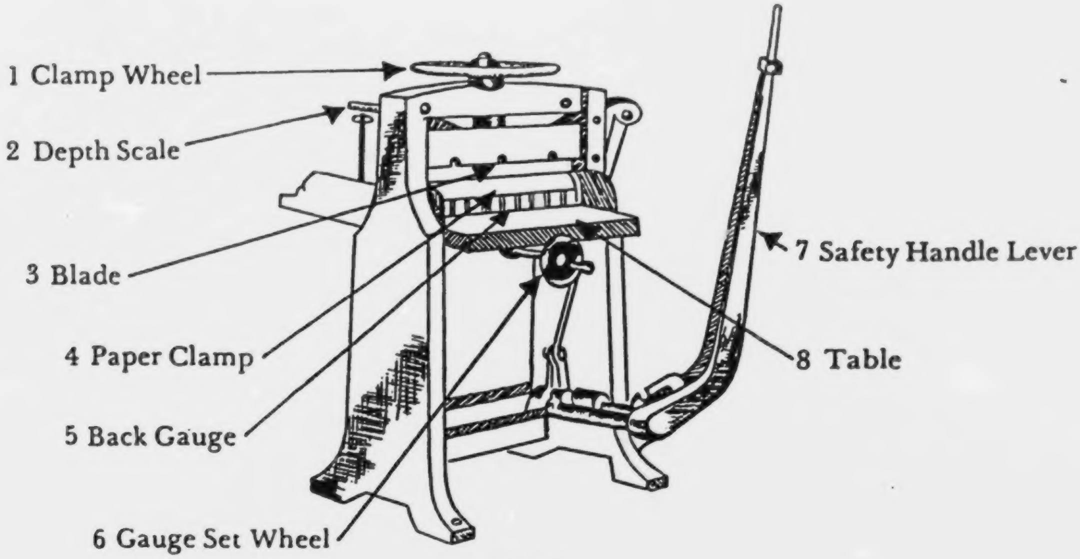
CRUCIBLE FURNACE


1 Lid Handle
2 Lid
3 Firebrick
4 Fire Box With Crucible
5 Switch
6 Igniter Switch
7 Air Control
8 Gas Control
9 Clay Drain Plug

6.33 SAFETY RULES FOR THE PAPER CUTTER (SHEAR)

1. Do not talk to anyone operating, or while operating the machine.
2. Do not allow yourself to be distracted until the cut has been made and the operation completed.
3. Stay clear when others are operating the machine; never crowd or hurry anyone at the paper cutter.
4. Beware of paper cuts.
5. Keep hands clear of the blade at all times; keep both hands on the cutting lever or handle during the cut and return stroke.
6. Jog stock under and in back of the blade with a block.
7. Do not overload the machine, or cut thin gauge metal.
8. Be certain that the handle or lever controlling the blade is in its proper position and that the safety lock is engaged before setting the back gauge or reaching for stock.
9. Report any malfunction to the instructor.
10. Shut off machine, engage safety lock, and clean up paper scraps.

SHEAR


1 Clamp Wheel
2 Depth Scale
3 Blade
4 Paper Clamp
5 Back Gauge
6 Gauge Set Wheel
7 Safety Handle Lever
8 Table

6.34 SAFETY RULES FOR THE OFFSET PLATE MAKER

1. Do not look into the light used for exposing the plates; it will burn eyes.
2. Do not turn on the light unless the vacuum frame is locked down.
3. Do not touch the photo carbons. They are hot.
4. Do not change the photo carbons. Let the instructor do this.
5. Shut off the machine and clean up the area when finished.

PLATE MAKER

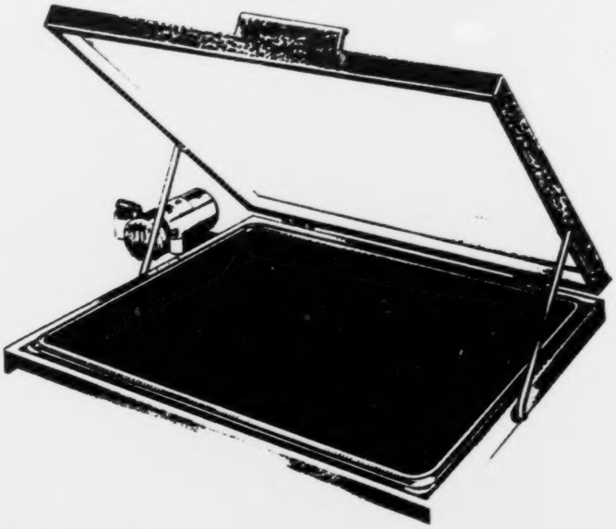
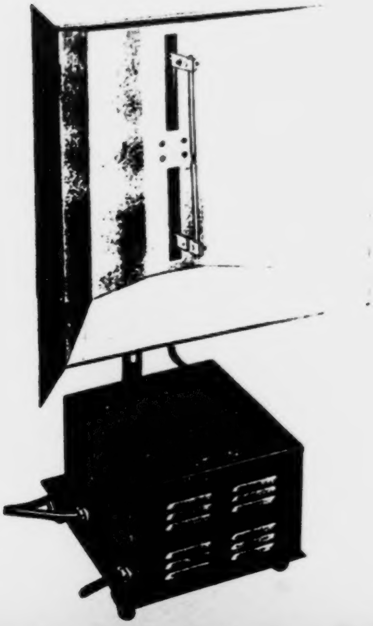
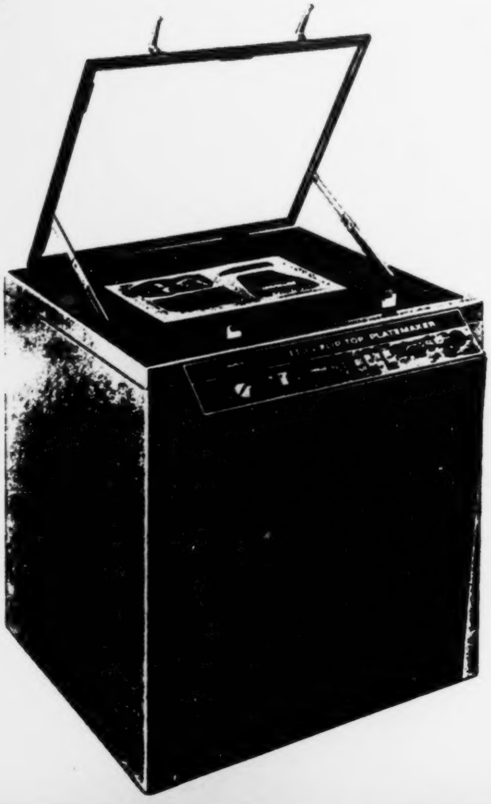


FIG. 13-13





6.35 SAFETY RULES FOR THE AUTOMATIC PRINTING PRESS

1. Never touch these machines unless operating them.
2. Beware of rollers and gears; keep covers and guards in place.
3. Never reach for misprinted or dropped paper while the press is in operation.
4. Keep hands away from grippers and all other moving parts of the press.
5. Have the instructor approve the setup.
6. In case of malfunction, shut down the press and summon the instructor.
7. Do not leave the press while it is in operation.
8. Do not oil or clean on the press while it is in operation.
9. Clean up press and return all paper and equipment to proper storage.

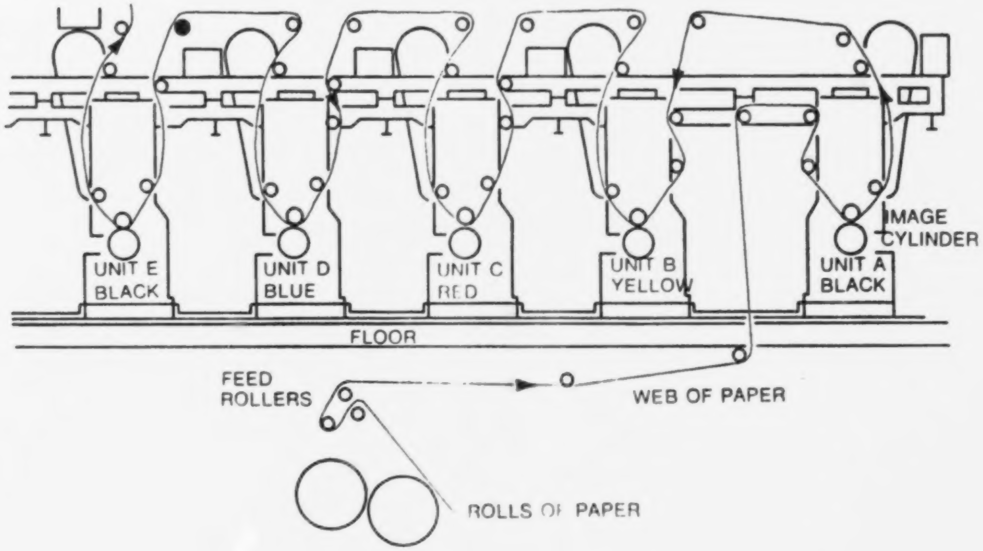
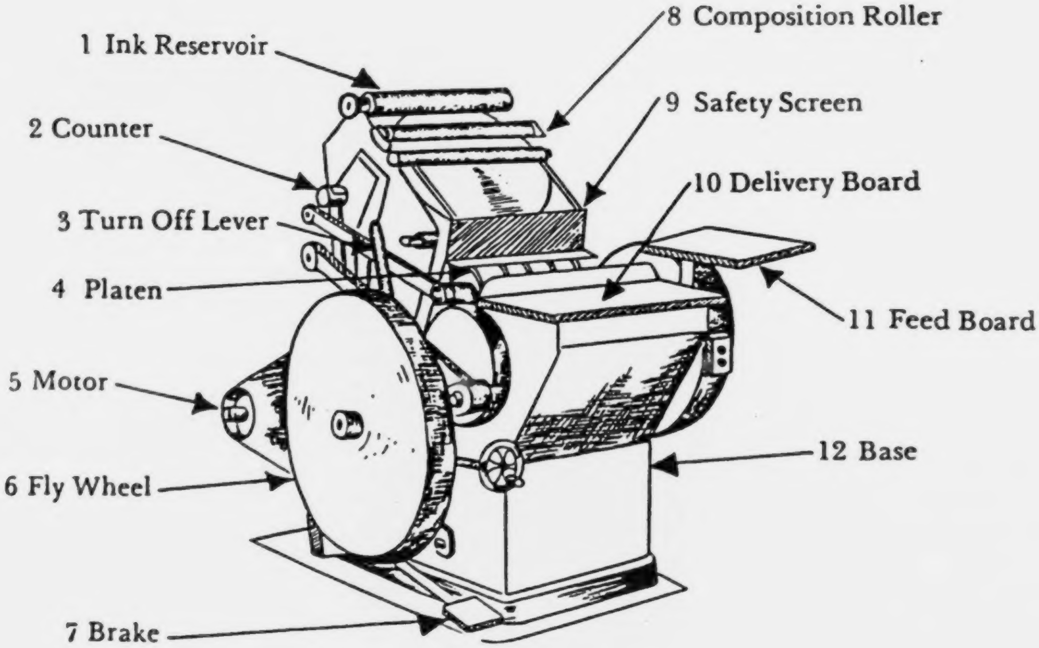


IMAGE CYLINDER
UNIT E BLACK
UNIT D BLUE
UNIT C RED
UNIT B YELLOW
UNIT A BLACK
FLOOR
FEED ROLLERS
WEB OF PAPER
ROLLS OF PAPER

6.36 SAFETY RULES FOR THE PLATEN PRESS

1. Make sure that the form is securely locked in the bed.
2. Give undivided attention to the press while operating it.
3. Have the instructor check your setup.
4. Always use the platen guard.
5. Stand erect and in front of the machine while operating.
6. There is a danger of hypnotic action; take a break on long runs.
7. Never reach into the press for misfed sheets or for any other reason.
8. Be careful of burns when melting wax.
9. Do not ink the press while it is in motion.
10. Do not make guide adjustments with the press in operation.
11. Start operation at lowest speed and increase as skill is developed.
12. Never leave the press while it is running.
13. Do not pour solvent onto the press when cleaning it.
14. Do not attempt to clean or oil the press while it is in motion.
15. Report any malfunctions to your instructor.
16. Clean up press and return all equipment to proper storage.
17. No loose clothing or unconfined long hair.

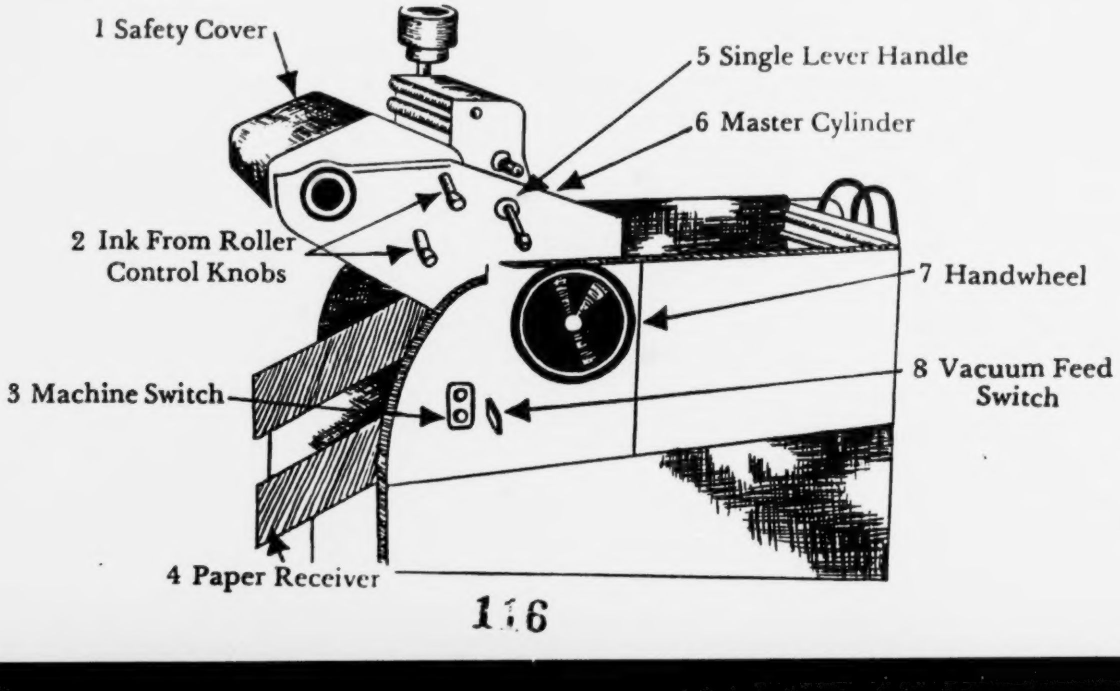
PLATEN PRESS


1 Ink Reservoir
2 Counter
3 Turn Off Lever
4 Platen
5 Motor
6 Fly Wheel
7 Brake
8 Composition Roller
9 Safety Screen
10 Delivery Board
11 Feed Board
12 Base

6.37 SAFETY RULES FOR THE OFFSET PRINTING PRESS

1. Operate only with instructor's permission and after receiving instruction.
2. Remove jewelry, eliminate loose clothing, and confine long hair.
3. Make sure all guards are in place and operating.
4. Always use proper eye protection.
5. Never reach for misprinted or dropped paper while the press is in operation.
6. Do not make internal adjustments while the press is in operation.
7. Do not clean the press while it is in operation.
8. The instructor should determine the operating speed.
9. Never reach across the press while it is in operation.
10. When finished with the press, it must be clean of all paper; equipment and tools must be returned to proper storage.

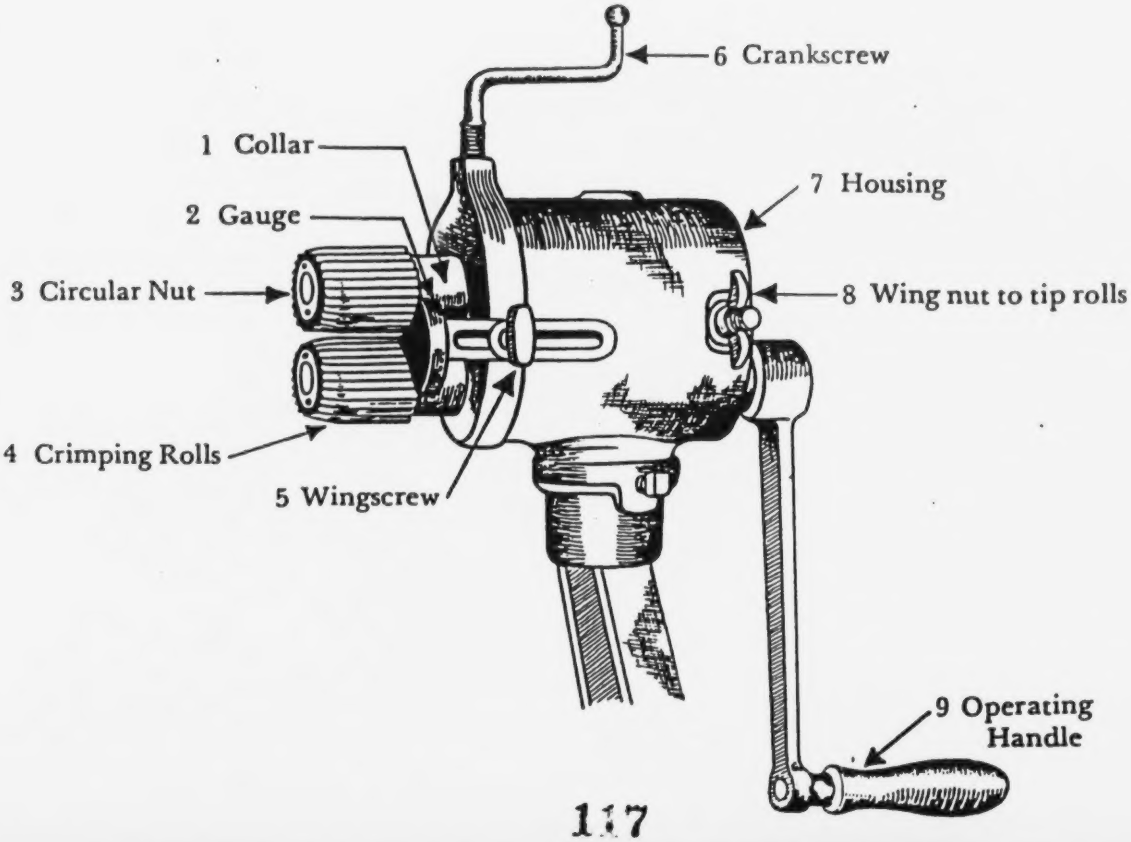
OFFSET PRINTING PRESS


1 Safety Cover
5 Single Lever Handle
6 Master Cylinder
2 Ink From Roller Control Knobs
7 Handwheel
8 Vacuum Feed Switch
3 Machine Switch
4 Paper Receiver

6.38 SAFETY RULES FOR THE BEADING MACHINE

1. Operate only with instructor's permission and after receiving instruction.
2. Remove jewelry, eliminate loose clothing, and confine long hair.
3. Always use proper eye protection.
4. Check setup and machine before operating.
5. Never surpass the capacity of the machine.
6. Keep hands and fingers clear of rolls.
7. Metal must be held firmly during forming operations.
8. Care must be taken to assure that rolls are on properly and securely.

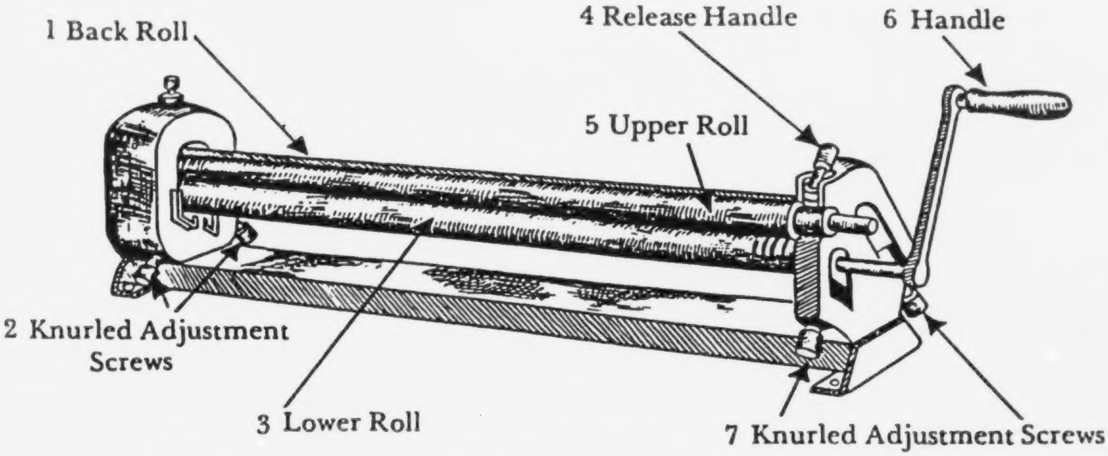
BEADING MACHINE


6 Crankscrew
1 Collar
7 Housing
2 Gauge
3 Circular Nut
8 Wing nut to tip rolls
4 Crimping Rolls
5 Wingscrew
9 Operating Handle

6.39 SAFETY RULES FOR THE HAND ROLLER

1. Operate only with instructor's permission and after receiving instruction.
2. Remove jewelry, eliminate loose clothing, and confine long hair.
3. Always use proper eye protection.
4. Never surpass the capacity of the machine.
5. Feed and operate from the front of the operator's position.
6. Keep fingers clear of rolls at all times.
7. Use proper adjustment and never force rolling process.
8. Keep machine well lubricated.

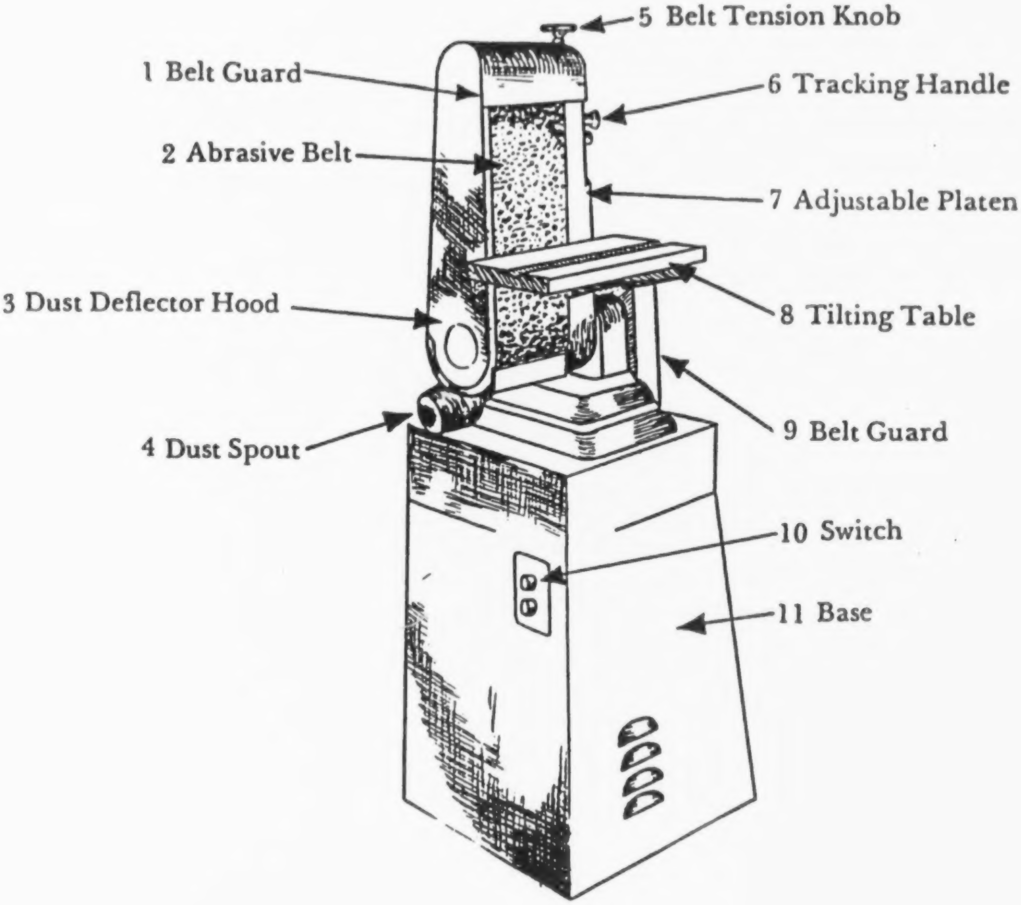
HAND ROLLER


1 Back Roll
4 Release Handle
6 Handle
5 Upper Roll
2 Knurled Adjustment Screws
3 Lower Roll
7 Knurled Adjustment Screws

6.40 SAFETY RULES FOR THE BELT FINISHING MACHINE

1. Operate only with instructor's permission and after receiving instruction.
2. Remove all jewelry, eliminate loose clothing, and confine long hair.
3. Make sure all guards are in place and operating correctly.
4. Always use proper eye protection.
5. Make all adjustments except final belt tracking with the power off.
6. Make sure there is adequate strong tension on the belt and that it is not torn.
7. When changing belts, make sure the new belt runs as arrows indicate.
8. The table should be adjusted to within 1/16 inch of the abrasive belt.
9. Keep hands clear of the abrasive belt while operating and keep material flat on the table.
10. The belt must be re-tracked if the angle of the basic machine is changed.

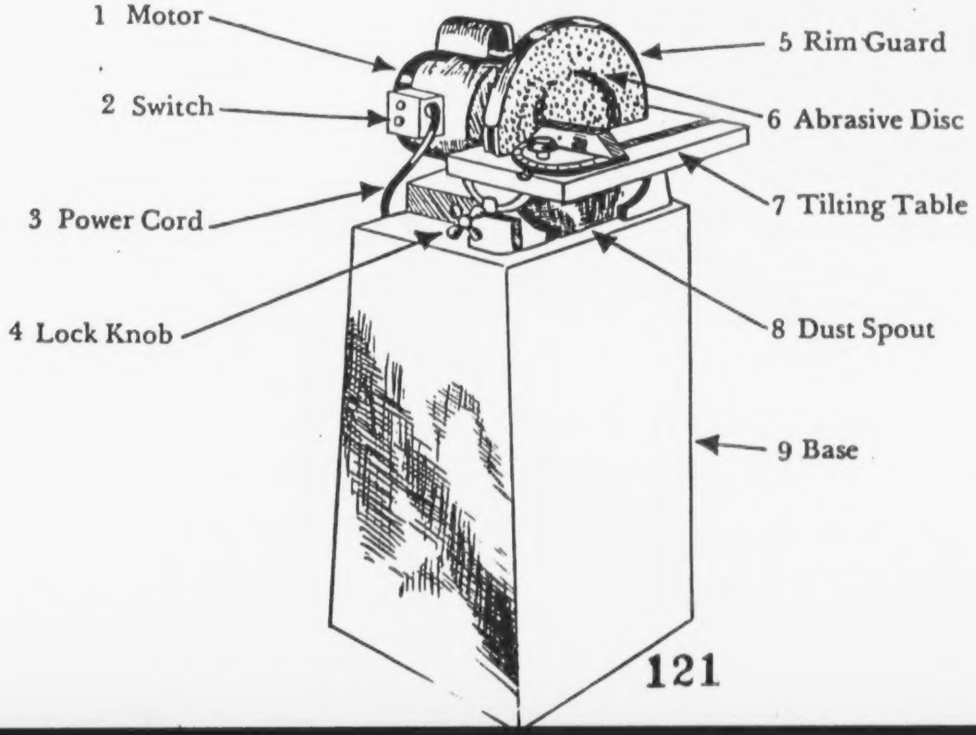
BELT FINISHING MACHINE


5 Belt Tension Knob
1 Belt Guard
6 Tracking Handle
2 Abrasive Belt
7 Adjustable Platen
3 Dust Deflector Hood
8 Tilting Table
9 Belt Guard
4 Dust Spout
10 Switch
11 Base

6.41 SAFETY RULES FOR THE DISC FINISHING MACHINE

1. Operate only with instructor's permission and after receiving instruction.
2. Remove jewelry, eliminate loose clothing, and confine long hair.
3. Make sure all guards are in place and operating correctly.
4. Always use proper eye protection.
5. Make sure adhesive is holding abrasive disc tightly to the revolving platen.
6. Abrasive disc should not be torn or damaged.
7. Material should be held flat against the table and hands kept clear of the abrasive disc.
8. The table should be adjusted to within 1/16-inch of the disc.
9. Work must be done on the side of the disc rotating downward.
10. Do not leave this machine until it has come to a full stop.

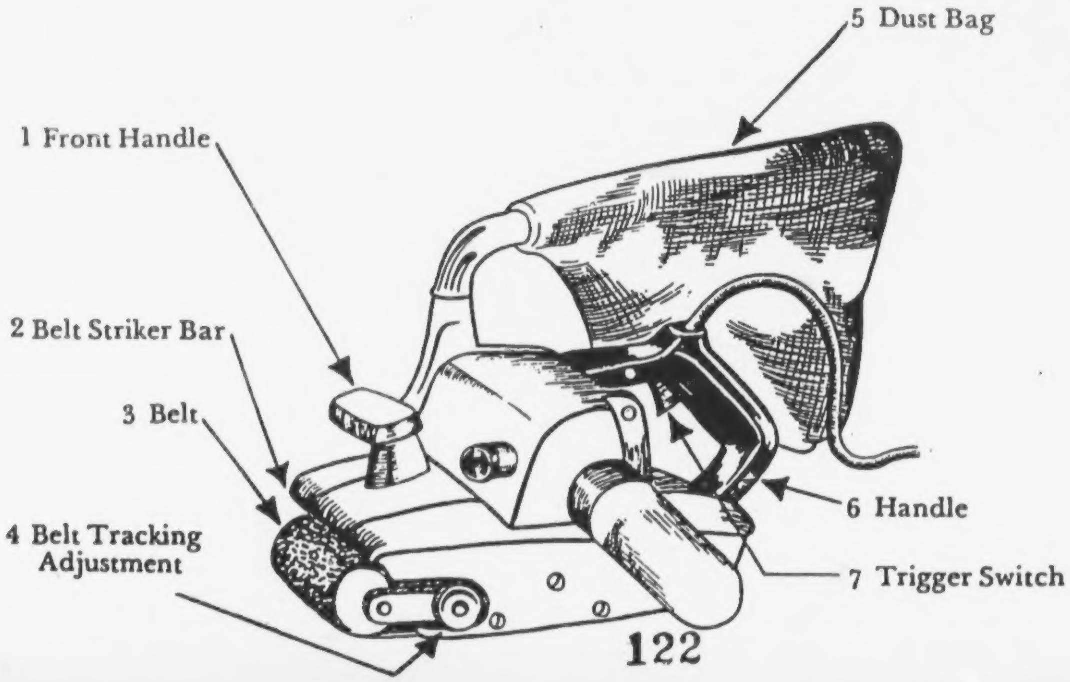
DISC FINISHING MACHINE


1 Motor
2 Switch
3 Power Cord
4 Lock Knob
5 Rim Guard
6 Abrasive Disc
7 Tilting Table
8 Dust Spout
9 Base

6.42 SAFETY RULES FOR THE BELT SANDER

1. Operate only with instructor's permission and after receiving instruction.
2. Remove jewelry, eliminate loose clothing, and confine long hair.
3. Make sure all guards are in place and operating correctly.
4. Always use proper eye protection.
5. Check to see if belt is properly installed and in good condition before starting.
6. Start sander above work; let rear of belt touch first.
7. Keep the electrical cord clear and the dust bag away from the sander belt.
8. Lift sander off the work before stopping.
9. Wait until the belt is completely stopped before placing sander on bench.
10. Empty dust bag into proper waste container.

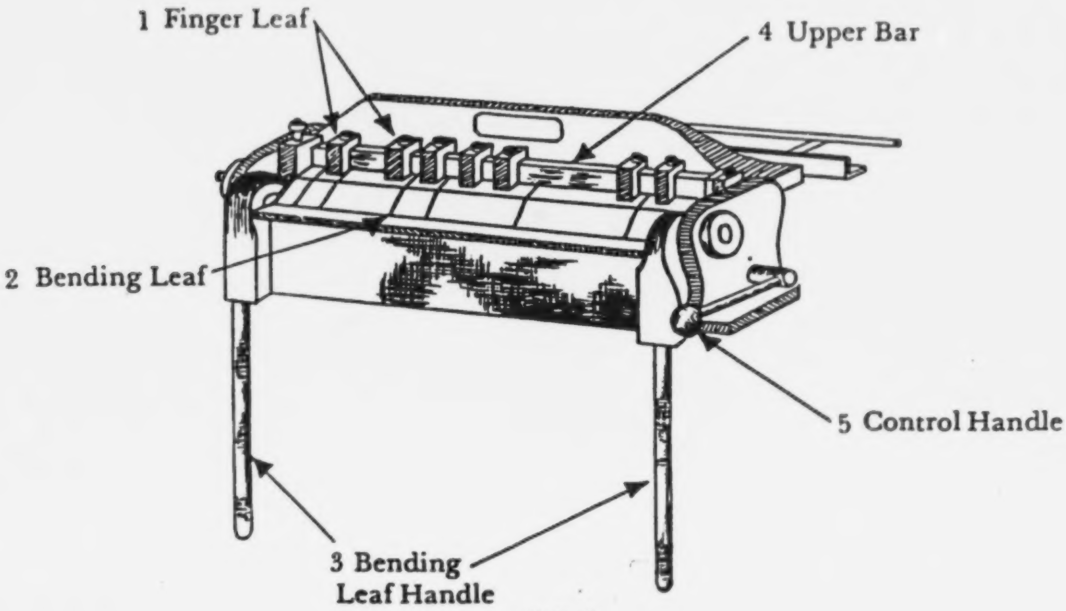
BELT SANDER


5 Dust Bag
1 Front Handle
2 Belt Striker Bar
3 Belt
6 Handle
4 Belt Tracking Adjustment
7 Trigger Switch

6.43 SAFETY RULES FOR THE BOX OR FINGER BRAKE

1. Operate only with instructor's permission and after receiving instruction.
2. Remove jewelry, eliminate loose clothing, and confine long hair.
3. Always use proper eye protection.
4. Check setup and machine before operating.
5. Never surpass the capacity of the machine.
6. Feed and operate from the front or the operator's position.
7. Whenever two people are needed to operate the brake, one shall be the operator, the other the helper.
8. When setting the fingers of the brake, be sure not to pinch your fingers.
9. Be sure that brake fingers are tightened securely on finger leaf.
10. Never work more than one thickness of metal.

BOX OR FINGER BRAKE


1 Finger Leaf
4 Upper Bar
2 Bending Leaf
5 Control Handle
3 Bending Leaf Handle

CONTENTS

7.0 VOCATIONAL EDUCATION SAFETY INSPECTION CHECK LIST

- 7.1 Purpose
- 7.2 Instructions for Use
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  - 7.3.3 Instruction
  - 7.3.4 Personnel Protection
  - 7.3.5 General Facility
  - 7.3.6 Electrical
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  - 7.3.8 Fire
  - 7.3.9 Welding
  - 7.3.10 Gas
  - 7.3.11 Housekeeping
  - 7.3.12 Accident Records
  - 7.3.13 First Aid
- 7.4 Recommendations

7.0 VOCATIONAL EDUCATION SAFETY INSPECTION CHECK LIST

School ______________________________________

Laboratory/Work Station ______________________________________

Instructor ______________________________ Date ________________

Inspection Team ______________________________

______________________________ ______________________________

______________________________ ______________________________

7.1 PURPOSE

A safe environment is an essential part of a safety program. The safe environment will exist only if hazards are discovered and corrected through regular and frequent inspections by school personnel-administrators, safety coordinators, teachers and students. Safety inspections are to determine if everything is satisfactory.

A safety inspection checklist for vocational education is an objective tool for helping improve working conditions in the area where used. Using a safety checklist for the inspection has some advantages over other methods of safety inspection. This list is intended to accomplish the following:

1. Inform, educate and remind personnel what to look for.
2. Train personnel to be observant and aware of their environment.
3. Provide a source of feedback information to teachers and administrators. This allows them to determine the effectiveness of their safety program and training.
4. Provide a record of safety items and safety activity.

7.2 INSTRUCTIONS FOR USE

1. A safety inspection team should complete the checklist for each vocational education laboratory or work station. (The building principal, division manager, or designee should be a member of the team.)

2. The inspection team may arrange for additional assistance from outside agencies for the regular safety inspections.

3. As a minimum, safety inspections should be made at the beginning of every school term or semester. More frequent inspections may be advisable.

4. Inspections should be planned in advance, preferably for times when students will be using the facility.

5. The current inspection report should be compared with previous reports and records to determine progress. The report should be studied in terms of accident situations so that special attention can be given to these conditions and locations which are accident producers.

6. In all cases where unsatisfactory responses are indicated, it is important that corrective actions be noted and copies forwarded to the proper authorities.

7. Each unsafe condition should be corrected as soon as possible in accordance with accepted local procedures.

8. A conference of the inspection team and the teacher should be held shortly following the inspection.

7.3 CHECKING PROCEDURE

Draw a circle around the appropriate letters, using the following code. Respond to all items:

S - Satisfactory (need no attention)

U - Unsatisfactory (needs immediate attention)

NA - Not applicable

Recommendations should be made in all cases where a "U" is circled. Space is provided at the end of the form for such comments. Designate the items covered by the recommendations, using the section letter and number applicable (e.g. B-2).

7.3.1. SCHOOL ADMINISTRATION

1. The school principal and school safety officer visit all laboratories to check for hazardous conditions and to make provisions for corrections . . . . S U NA
2. The school principal requires that standardized written reports on hazardous conditions be submitted and distributed to the proper individuals to assure corrective action . . . . . . S U NA
3. A written procedure has been established for reporting defective equipment immediately to assure prompt repair . . S U NA
4. The school principal keeps records of all inspections and these records are readily available for reference . . . . S U NA
5. The school district has defined "an accident" and has available employee and student accident reporting forms which fulfill the state statistical requirements . . . . S U NA

6. All accidents are promptly reported and analyzed. Immediate steps are undertaken to correct causes of accidents, and copies of all reports are kept in a school file until it is determined they are no longer necessary . . . . S U NA

7. The school has an effective standardized district safety policy . . . . S U NA

8. The school has readily available all necessary information in order to reach parents or guardians in case of an emergency . . . . S U NA

9. The school has an effective policy and procedure to follow in case of accidents . . . . S U NA

10. The school has a policy and procedure for the administration of first aid . . S U NA

11. The instructor is notified of all student disabilities (physical and mental) . . . . S U NA

12. The instructor has direct communications with the school nurse and outside telephone lines available . . . . S U NA

13. First aid personnel or nurse is available at all times . . . . S U NA

14. The school principal accepts the responsibility for keeping class sizes appropriate for activities, student age, facility size, and the number of work stations available . . . . S U NA

15. The school principal is aware of his responsibility and liability in regard to students' protection . . . . S U NA

16. The school principal requires that the shop areas be maintained and cleaned, and provided with the same custodial services available to other general education programs . . . . S U NA

17. The school principal will make sure that a certified instructor is in attendance when student work takes place . . . . S U NA

18. A policy exists for dealing with the removal of students who consistently violate safety regulations . . . . S U NA

7.3.2 INSTRUCTOR

1. Teacher supervision is provided at all times when classes are in session . . . . S U NA

2. The instructor continuously inspects the facility to discover needed repairs and corrections . . . . S U NA

3. The instructor utilizes an inspection checklist when making formal inspections and maintains file copies . . . . . S U NA

4. The instructor reports all hazardous conditions to the proper administrator . . . . S U NA

5. The instructor keeps records of all inspections and has copies of inspection reports readily available for reference . . . . S U NA

6. The instructor keeps records of all maintenance problems and the disposition of requests for corrections . . . . S U NA

7. The instructor keeps records of all accidents and analyzes them immediately for corrective measures . . . . S U NA

8. The instructor keeps records of all safety instruction and evaluations . . . S U NA

9. The instructor selects student activities, keeping in mind the maturation level and ability of the students involved . . . . S U NA

10. Instructor-owned tools are not used by students unless a district policy has been established to cover their use, and the school principal has been informed . . . . S U NA

11. The instructor makes sure that students wear protective equipment when needed . . S U NA

12. The instructor is responsible to see that personal protective equipment has been sterilized . . . . S U NA

13. Instruction is reinforced by continuous proper example through deeds and action of the instructor, such as wearing protective equipment in all situations deemed necessary . . . . S U NA

14. The instructor is knowledgeable in the use of the various fire extinguishers in the facility . . . . S U NA

15. When classes are not in session, the instructor makes sure that all main power switches are in the "off" position . . . . S U NA

16. The instructor makes sure that all machines are off and tagged when they are being cleaned or adjusted . . . . . . S U NA

17. A system for handling hot materials has been established . . . . S U NA

18. Routine preventative maintenance is practiced to assure against breakdown of equipment and safety protection devices . . . . S U NA

7.3.3 INSTRUCTION

1. The student's sense of responsibility is promoted, developed and periodically evaluated . . . . S U NA

2. Students receive instruction in the use of all tools and equipment they are expected to operate . . . . S U NA

3. Students are tested and permission is granted before machines are operated . . . . S U NA

4. Ground rules are established and enforced for safe, efficient shop operation . . . . S U NA

5. Students are instructed and alerted to possible hazardous operations and are monitored in these activities . . . . S U NA

6. "Horseplay" and practical jokes are dangerous and are not tolerated . . . . S U NA

7. Proper instruction and warning are given in the use and handling of toxics, caustics and volatile material . . . . S U NA

8. In order to provide continuous safety instruction, questions on safety are included in all phases of the instructional program . . . . S U NA

9. Students are instructed in the proper methods of handling and lifting materials . . . . S U NA

10. Students are given the responsibility to see that they and other students are clear of machines when turning them on, never to leave a machine in a running position, or stop one with their hands or a piece of material . . . . S U NA

11. Students are instructed to stay clear of others operating machines, and if necessary to approach an operator, to do so in such a manner as not to annoy or alarm the person . . . S U NA

12. All work undertaken is approved through some established method before proceeding . . . . S U NA

13. Materials being worked are secured when the operation being conducted so demands . . . . S U NA

14. A class personnel organization is used including a student safety engineer . . . . S U NA

15. Safety bulletin boards, posters, and student reports are part of the total safety program . . . . S U NA

16. Students are instructed as to how to report hazards and fires . . . . S U NA

17. Rotate students on the safety committee so that as many students as possible have an opportunity to participate . . . . S U NA

18. Safety is taught as an integral part of each teaching unit . . . . S U NA

19. Safety rules are posted particularly at each station . . . . S U NA

20. Printed safety rules are given to each student . . . . S U NA

21. Pupils take a safety pledge . . . . S U NA

22. Use of a safety inspector . . . . S U NA

23. Use of a student shop safety committee . . . . S U NA

24. Use of safety contests . . . . S U NA

25. Motion and/or slide films on safety are used in the instruction . . . . S U NA

26. Use of a suggestion box . . . . S U NA

27. Talks on safety are given to the classes by industry representatives . . . S U NA

28. Tours are taken of industrial plants as a means of studying safety practices . . . . S U NA

29. Principle safety inspections of the shop are made by a student committee . . S U NA

30. Student safety committee investigates all accidents . . . . S U NA

31. A proper record is kept of safety instructions which are given, preferably showing the signature of students of tests given in this area . . S U NA

7.3.4 PERSONNEL PROTECTION

1. In compliance with the state law, eye protection devices will be worn and appropriate signs posted . . . . . . S U NA

2. Eye-wash baths and showers are available when using caustic materials . . . . S U NA

3. After use, eye-protective devices are cleaned and returned to properly designed storage racks . . . . S U NA

4. In all areas needing special body-protective clothing, such clothing is provided and used. (Example: aprons, shoes, gloves) . . . . S U NA

5. In all areas needing respiration and noise suppression devices, equipment is provided and used . . . . S U NA

6. Students are cautioned on the danger of loose clothing, jewelry, ties, long hair, etc. (Regulations in regard to their dangers are enforced) . . . . S U NA

7. All injuries are reported to the instructor for immediate attention . . . S U NA

8. If individual eye protection is not provided, equipment is properly disinfected before its use . . . . S U NA

9. Shields are provided for electric welding . . . . S U NA

10. Provisions are made for cleaning and sterilization of respirators . . . . S U NA

11. Students are examined for safety knowledge ability . . . . S U NA

12. Students sleeves are rolled above elbows when operating machines . . . . . S U NA

13. Clothing of students is free from loose sleeves, flopping ties and loose coats, etc. . . . . S U NA

7.3.5 GENERAL FACILITY

1. One instructor has the overall responsibility for each major facility . . . . S U NA

2. Each vocational facility can be locked separately . . . . S U NA

3. Provision has been made for keeping inappropriate garments and other materials out of activity areas . . . . . S U NA

4. Good housekeeping standards are observed . . . . S U NA

5. The student educational clean-up program is backed up daily with complete custodial services . . . . S U NA

6. Waste (shavings, sawdust, paint, and oil rags) is collected daily and disposed of by the custodian . . . . . . S U NA

7. Floors are maintained in a condition conducive to safe practices with nonskid surfaces provided around machines . . . . S U NA

8. Designated safety zone areas are provided around all areas of work . . . . S U NA

9. Aisles are clear of protruding materials . . . . S U NA

10. Room furniture and equipment are arranged for optimum safety . . . . S U NA

11. Nonglare lighting is provided for all work areas according to accepted standards . . . . S U NA

12. Stairways within existing laboratories have safe tread and rise with unobstructed access and with approved railings . . . . S U NA

13. Railings and treads are color coded . . . S U NA

14. Two widely separate marked exits are available from each major laboratory area . . . . S U NA

15. Facilities are light, pleasant, clean and conducive to good instruction . . . . S U NA

16. Machine operation regulations and safety procedures are posted conspicuously near areas of operation . . S U NA

17. Parts of machines and equipment needing special attention or caution are painted brightly with correct color code . . . . S U NA

18. Machine and work stations are located in relationship to the amount of supervision required . . . . . S U NA

19. Machine location has been determined by needed operator space requirements and process compatibility . . . . S U NA

20. Health hazards were considered in plant design to minimize injuries from excess heat, noise, fire and fume conditions . . . . S U NA

21. Machines, benches, and other equipment are arranged so that they conform to good safety practices . . . . S U NA

22. Condition of walls, windows and ceiling . . . . S U NA

23. Illumination is safe, sufficient, and well placed . . . . S U NA

24. Ventilation is adequate and proper for conditions . . . . S U NA

25. Temperature control is adequate . . . . . S U NA

26. Fire extinguishers are of proper type, adequately supplied, properly located and maintained . . . . S U NA

27. Teacher and pupils know location of and how to use proper type of extinguisher for various fires . . . . . S U NA

28. Number and location of exits is adequate and properly identified . . . . S U NA

29. Proper procedures have been formulated for emptying the room of pupils and taking adequate precautions in case of emergencies . . . S U NA

30. Lockers are inspected regularly for cleanliness and fire hazards . . . . . . S U NA

31. Locker doors are kept closed . . . . . . S U NA

32. Walls are clear of objects that might fall . . . . S U NA

33. Utility lines are properly identified . . . . S U NA

34. Teachers know the procedure in the event of fire including notification of the fire department and the evacuation of the building . . . S U NA

7.3.6 ELECTRICAL

1. Each laboratory area has its own master control switch and power panel located for easy access . . . . . . S U NA

2. Laboratory power panels have clearly identified individual power switches for each machine . . . . S U NA

3. Extension cords are not used for permanent installation, are not spliced, and have three-way grounded plugs . . . . S U NA

4. All hand-held portable power tools are equipped with "dead man" controls only . . . . S U NA

5. Regulator, stands and pilot lights are provided for all electrical soldering irons . . . . S U NA

6. All electrical apparatus in areas of concentrated vapors are vapor proof . . . S U NA

7. All switches are enclosed . . . . S U NA

8. Electrical outlets and circuits are properly identified . . . . S U NA

9. All machine switches are within easy reach of the operators . . . . S U NA

10. No temporary wiring is evident . . . . . S U NA

7.3.7 EQUIPMENT

1. Safety instruction for use of each machine is posted . . . . S U NA

2. Machines are in safe operating condition at all times . . . . S U NA

3. "Out-of-Order" signs are secured to machines not in working order and power panel switch is in "off" position . . . . S U NA

4. All machines are securely fastened in place if designed to be stationary . . . S U NA

5. Machine and equipment are provided with guards meeting industrial standards and guards are in proper position for safe machine operation . . . S U NA

Items requiring special consideration:

(a) Squaring shears finger guard . . . . S U NA

(b) Foot treadle stops on squaring shears . . . . S U NA

(c) Jointer knife guards--left and right . . . . S U NA

(d) Abrasive wheel safety eye shields . . . . S U NA

(e) Abrasive wheel tool rests . . . . . . S U NA

(f) Abrasive wheel guards . . . . S U NA

(g) Table saw guard including anti-kickback . . . . S U NA

(h) Radial saw guard . . . . S U NA

(i) Radial saw forward stop and positive saw return . . . . S U NA

(j) Radial saw anti-kick back device . . . . S U NA

(k) Machine belt and pulley guards . . . S U NA

(l) Air compressor belt guards . . . . . S U NA

(m) Compressed air is not used for cleaning purposes until it has been reduced to less than 30 p.s.i. and proper tip provided . . . . S U NA

(n) Compressed air is not used for cleaning purposes where posibility of eye injury exists . . . . S U NA

6. Equipment control switches area readily accessible to the operator while in a normal operating position . . S U NA

7. A positive "off" position switch is located on each machine . . . . S U NA

8. Proper tools and materials are available for machine cleaning . . . . . . S U NA

9. Machines are arranged so that workers are protected from hazards of other machines, passing students, etc. . . . . S U NA

10. Danger zones are properly indicated and guarded . . . . S U NA

11. All guards are used as much as possible . . . . S U NA

12. All equipment control switches are easily available to operator . . . . . . S U NA

13. All machines are locked off when instructor is out of room . . . . S U NA

14. Brushes are used for cleaning equipment . . . . S U NA

15. Non-skid areas are provided around machines . . . . S U NA

16. Machines are in safe working condition . . . . S U NA

17. Machines are guarded to comply with American Standards Association, state and local code . . . . S U NA

18. Adequate supervision is maintained when students are using machines and tools . . . . S U NA

19. Tools are kept sharp, clean, and in safe working order . . . . S U NA

20. All hoisting devices are in safe operating condition. Safety chains are used . . . . S U NA

21. Machines are shut off while unattended . . . . S U NA

22. Adequate storage facilities for tools, equipment, etc., not in immediate use . . . . S U NA

7.3.8 FIRE

1. Fire-approved (U.L. - FM) storage and waste containers are readily accessible used and emptied daily . . . . S U NA

2. Parts (solvent) wash tanks are fire fused . . . . S U NA

3. Finish and spray room doors swing out and cannot be locked from the inside . . S U NA

4. Filters in spray booths are replaced regularly . . . . S U NA

5. Fire approved storage cabinets are provided for all flammable and combustible liquids . . . . S U NA

6. Provision has been made for a fire approved bulk storage area. (Refer to local fire marshall) . . . . S U NA

7.3.9 WELDING

1. Proper protective clothing is worn when needed . . . . S U NA

2. Goggles with the proper lenses are used when torch welding . . . . S U NA

3. An arc-welding helmet with correct lenses is used when electric welding (Min. Shade #12-MIG & TIG) (Min. Shade #10-STD. ARC) . . . . S U NA

4. Observers use acceptable protection . . . S U NA

5. Welding is done only in areas free of combustible materials . . . . S U NA

6. Cylinders are secured upright, clear of passageways, and stored in ventilated areas . . . . S U NA

7. Extra cylinders are properly stored, meeting regulations of the State Department of Labor and Industry Chapter X, 24 06. . . . . S U NA

8. Gas pipelines have been installed and are maintained according to code . . . . S U NA

9. Pipelines are checked each year by persons knowledgeable with code requirements . . . . S U NA

10. Piped welding systems will have back pressure valves in both lines and conveniently located shut off valves which will not be quick opening . . . . S U NA

11. Torches and regulators are clean, well maintained, and in good operating condition . . . . S U NA

12. Hoses are maintained in good condition . . . . S U NA

13. Only spark lighters are used to light torches . . . . S U NA

14. Anti (fire) flashbacks are installed where required in all hoses and lines . . S U NA

15. The welding area is located in such a manner that an arc cannot be struck on (gas) cylinders, gas lines, or water lines . . . . S U NA

16. Reflective screens are provided and used to protect others from arc flashes and burns . . . . S U NA

17. When items are to be welded and will not fit into screened area, all persons near the area will be provided proper protective equipment . . . . S U NA

18. Arc welding is done in dry areas only . . S U NA

19. The electrode holder is maintained and stored in good condition to eliminate possible accidental arcs . . . S U NA

20. Proper ventilation is provided . . . . . S U NA

7.3.10 GAS

1. Gas-operated equipment is ignited from an automatic ignition system or pilot light . . . . S U NA

2. The main supply cutoff valve is identified, is readily accessible, and is located outside possible heat or fire areas . . . . S U NA

3. Gas equipment is provided with shutoff valves and a safety system. (Example: spark ignition, gas pressure regulator, safety gas check valve, etc.) . . . . S U NA

4. Only nonflammable insulating materials have been installed adjacent to gas appliances . . . . S U NA

5. Warning signs are posted when hot metals are poured . . . . S U NA

6. Properly designed and constructed equipment is used for handling molten metal when casting . . . . S U NA

7. Gas flow to appliances is regulated, so that when appliance valve is turned on full, the flames are not too high . . . . S U NA

8. Gas appliances are properly insulated with insulating material from tables, benches, adjacent walls, or other flammable materials . . . . S U NA

9. There are no gas leaks, nor is any odor of gas detectable in any part of the facility . . . . S U NA

10. Instruction has been given concerning the lighting of gas furnaces operating with both air and gas under pressure . . S U NA

11. No gas hose is used where pipe connections could be made . . . . S U NA

12. When lighting the gas forge, glasses and face shields are worn . . . . S U NA

13. In shutting down the gas furnace, the gas valve is closed before the air valve . . . . S U NA

14. Fire approved storage cabinets are provided for all flammable and combustible liquids . . . . S U NA

15. Provision has been made for a fire approved bulk storage area. (Refer to local fire code) . . . . S U NA

7.3.11 HOUSEKEEPING

1. General appearance as to orderliness. . . S U NA

2. Adequate and proper storage space for tools and materials . . . . S U NA

3. Benches are kept orderly . . . . S U NA

4. Corners are clean and clear . . . . S U NA

5. Special tool racks, in orderly condition are provided at benches and machines . . . . S U NA

6. Tools, supply, and/or material room is orderly . . . . S U NA

7. Sufficient scrap boxes are provided . . . S U NA

8. Scrap stock is put in scrap boxes . . . . S U NA

9. Materials are stored in an orderly and safe condition . . . . S U NA

10. A spring lid metal container is provided for waste and oily rags . . . . S U NA

11. All waste materials and oily rags are promptly placed in the correct containers . . . . S U NA

12. Containers for oily rags and waste materials are frequently emptied . . . . S U NA

13. Flammable materials are stored in metal cabinets . . . . S U NA

14. Machines have been color conditioned . . S U NA

15. Safety cans are provided for flammable liquids . . . . S U NA

16. Bulk storage of flammable materials is provided outside of the main building . . . . S U NA

17. A toe board or railing around a mezzanine used for storage or washing facilities . . . . S U NA

7.3.12 ACCIDENT RECORDS

1. There is a written statement outlining the proper procedure when and if a student is seriously hurt . . . . S U NA

2. Adequate accident statistics are kept . . S U NA

3. Accidents are reported to the proper administrative authority by the instructor . . . . S U NA

4. A copy of each accident report is filed with the appropriate personnel . . . . . . S U NA

5. Accident reports are analyzed for instructional purposes and to furnish the basis for elimination of hazards . . . . S U NA

7.3.13 FIRST AID

1. An adequately stocked first-aid cabinet is provided . . . . S U NA

2. The first aid is administered by a qualified individual . . . . S U NA

3. The school has individuals qualified to administer first aid . . . . S U NA

7.4 RECOMMENDATIONS

Recommendations should be made in all cases where a "U" is circled. Space is provided at the end of the form for such comments. Designate the items covered by the recommendations, using the section letter and number applicable (example 7.3.5.1).

School ______________________________

Laboratory ______________________________________

Instructor _________________________ Date ______________

Inspected by ____________________________________

Section
and Number ____

____

____

____

THREE COPIES : #1 Teacher

#2 Inspection Team

#3 Administrator

CONTENTS

8.0 FORMS AND ACCIDENT REPORTING

- 8.1 Permission Form
- 8.2 Industrial Arts Notification Form
- 8.3 Vocational Education Safety Pledge

8.0 FORMS AND ACCIDENT REPORTING

Any accident that occurs during vocational education activities must be reported. This applies to after school accidents as well as those during the school day. Any accident, even a slight cut, must be reported since this indicate corrective action that must be taken by the teacher, administrator, or both.

A form for the reporting of these accidents can be adapted from the one on the following page. This report should be completed in triplicate; one for the principal, one for the school nurse, and one for the teacher's permanent file.

Accident Reporting and Analysis

1. Require students to report all accidents to the teacher, regardless of nature or severity.

2. Keep a record of all accidents resulting in injury to students, regardless of nature or severity.

3. Analyze all accident reports for the purpose of aiding in the prevention of other accidents.

4. Use your school district's printed or duplicated form to record the details of accidents and forward to the appropriate personnel.

PERMISSION FORM

SCHOOL: ______________________ TEACHER: _________________________

NAME OF PARENT OR GUARDIAN: ______________________________________

________________________________ is enrolled in our _____________
(name of student) (name of
_____________________ program and will have the opportunity to use
(program)
various equipment. Appropriate instruction in the proper use of the tools and equipment is given and close supervision is maintained. Every precaution is taken to prevent accidents. We are asking your cooperation in impressing ________________________
(name of student)
with the importance of working safely.

It is mandatory that all students accept the obligation to obey the safety rules designed to protect themselves and others.

You are welcome to visit our vocational education program facilities. Please check through the main office.

I give my permission for ____________________________ to use the
(name of student)
tools and equipment in the vocational education program.

____
(parent or guardian)

I hereby do accept the obligation to obey the safety rules of the shop or laboratory at all times.

____
(date) (student)

Please identify any health problem which may have a bearing on your student's participation in this class (example: color blindness): ____

____

____

____

(7-86)

THE STUDENT AND SAFETY IN INDUSTRIAL ARTS

School District ________________________________

Industrial Arts Department

School: ______________________________

Teacher: _____________________________

To: ______________________________
(Parent or Guardian)

______________________________________ is enrolled in our
(Name of Student)
industrial arts program and will have the opportunity to use various tools and equipment. Appropriate instruction in the safe operation of these tools is given and close supervision is maintained at all times. Although every precaution is taken to prevent accidents, a certain risk is involved due to the nature of the experience, the age of the student, and the learning environment.

We are asking your cooperation in impressing upon your child, the importance of being careful. This we believe will back up the instruction that is given in school.

We welcome your visit to our school and the industrial arts department to see our program. These visits can be arranged by calling ______________________________.

Thank you very much for your help and assistance in providing your child with the "real world" experience of industrial arts in a safe working environment.

I have read the attached communication and I understand the type of program that ______________________________ is enrolled in.
(Student Name)
I will stress the safety aspects of this program to my child. I encourage my child to participate fully in this industrial arts program.

______________________________________ ________________
(Signature of Parent or Guardian) (Date)

Phone ________________ (Home) ________________ (Work) ____________

Please identify any health problems which may have a bearing on your child's participation in this class.

____

____

____

I agree to observe all safety rules and procedures for safe operation and conduct in the school industrial arts shop and will wear approved eye protection at all times while in the laboratory in accordance with state law.

____________________________________ ________________
Signature of Student Date

(7-86)

VOCATIONAL EDUCATION SAFETY PLEDGE

1. I pledge myself to follow all rules and regulations pertaining to the safety of myself and others.
2. I will constantly watch for any unsafe acts, practices, or conditions that will reduce the safety of myself or others.
3. I will report all unsafe acts, practices or conditions to the instructor immediately.
4. I will do my job in a safe and orderly manner, so that I will not endanger the safety of myself or others.
5. I will report all injuries, no matter how slight, to the instructor immediately.
6. I will keep my work station in a safe and orderly condition at all times.
7. I will promote and respectfully solicit the cooperation of all pupils in safety and good housekeeping.
8. I will bear in mind at all times that my job will be safe only as long as I make it safe.
9. I will never lose sight of the fact that accidents don't just happen; they are caused.
10. I will do these things with respect and mutual understanding in all my relations with my fellow students, because only in this way can I feel sure that I am doing everything within my power to make my room and my school a safer and better place in which to work.

______________________________ ____________________
Student Signature Date

CONTENTS

9.0 SAFETY POSTERS

9.1
9.2
9.3
9.4
9.5

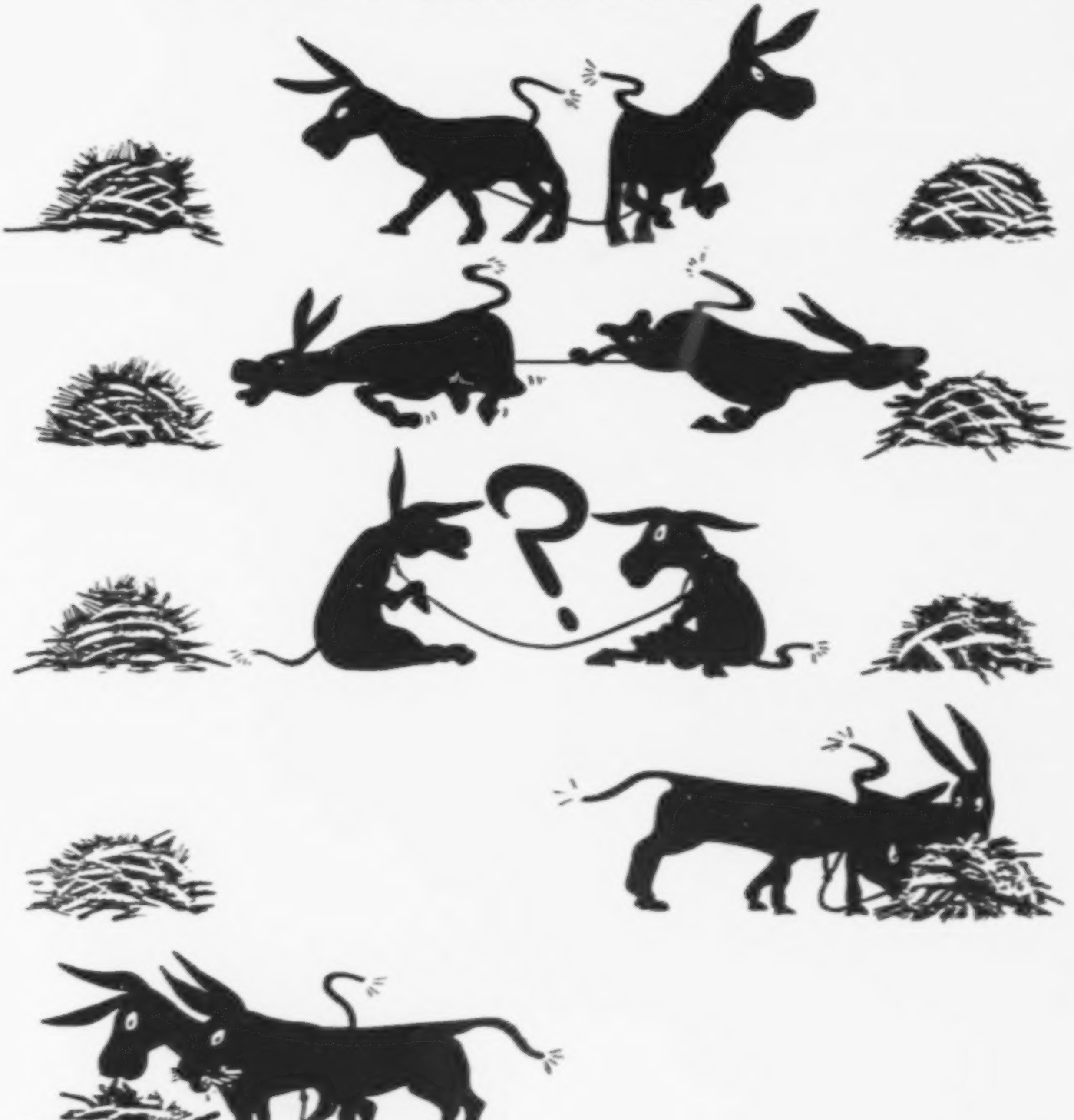
QUACK DOWN ON ACCIDENTS

OR

YOU'LL BE A DEAD DUCK

DISTRIBUTED BY INDIANA INDUSTRIAL EDUCATION ASSOCIATION

COOPERATION



POOR HOUSEKEEPING INDICATORS

1 OBJECTS, MATERIAL ON FLOORS

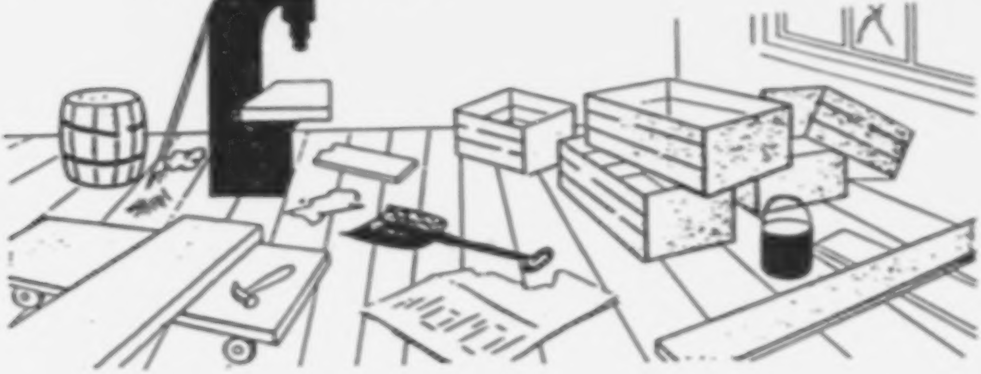
2 EQUIPMENT OUT OF PLACE

3 POOR STORAGE PRACTICE

4 POOR WASTE DISPOSAL SYSTEM

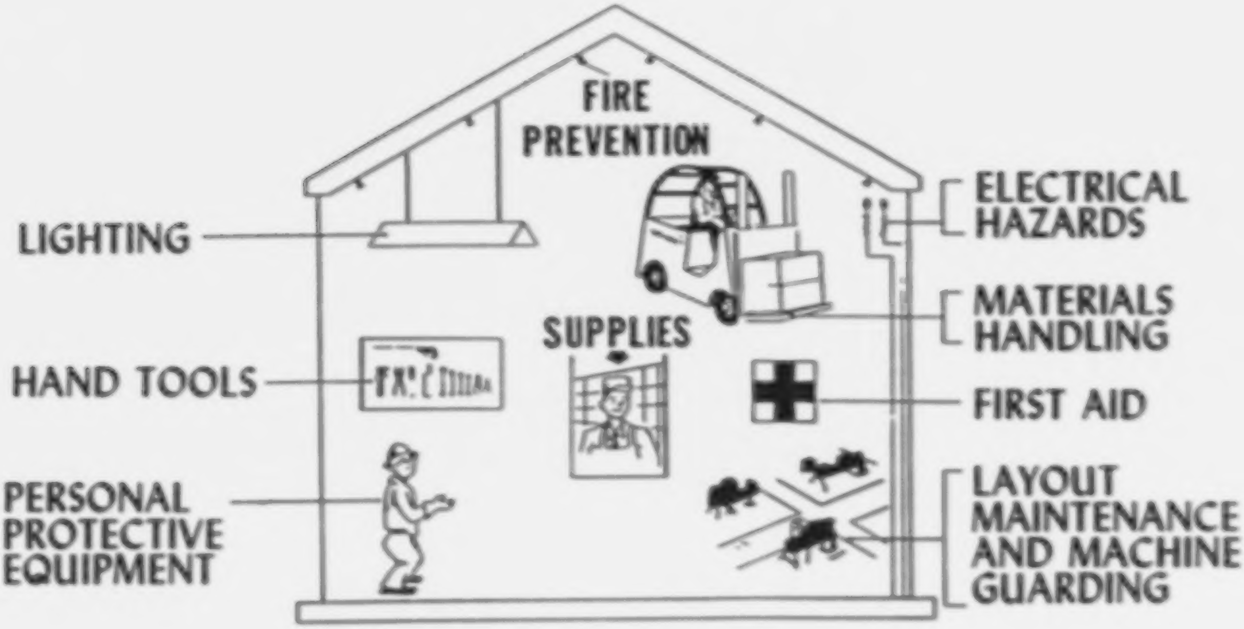
5 DIRTY WALLS, WINDOWS, LIGHTS

6 FIRE HAZARDS



SURVEY FOR APPRAISAL

A. PLANT PHYSICAL CONDITIONS

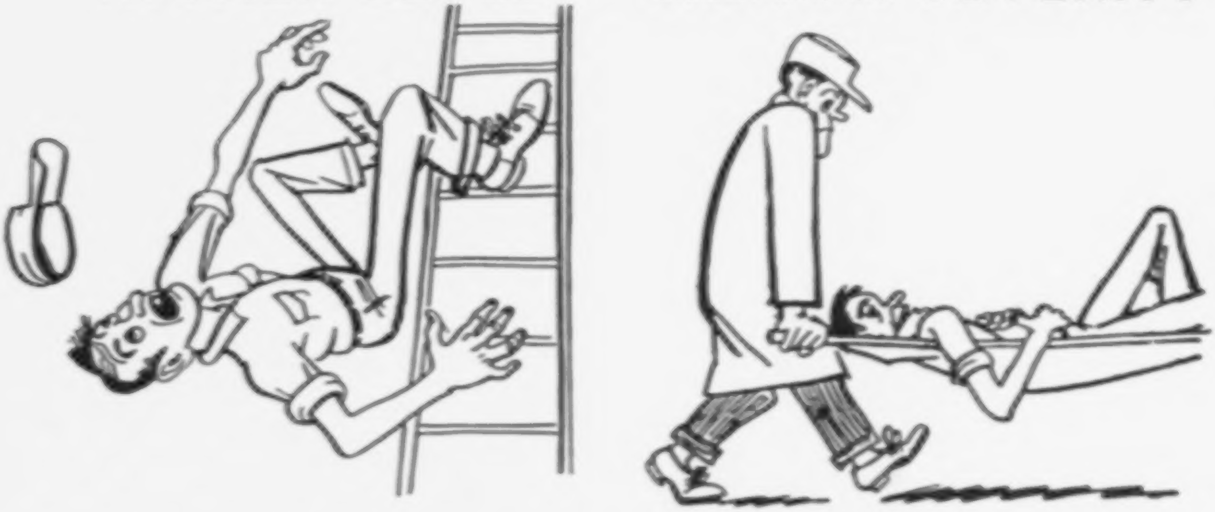

FIRE PREVENTION
LIGHTING
ELECTRICAL HAZARDS
MATERIALS HANDLING
SUPPLIES
HAND TOOLS
FIRST AID
PERSONAL PROTECTIVE EQUIPMENT
LAYOUT MAINTENANCE AND MACHINE GUARDING

B. SAFETY ACTIVITIES

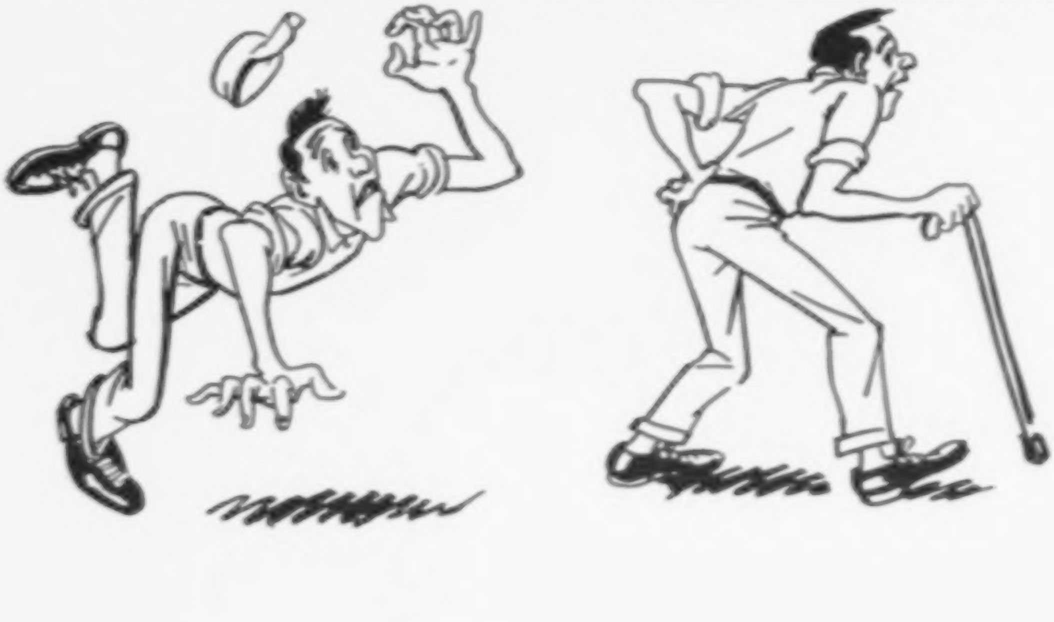
SAFETY COMMITTEE

CLASSES of FALLS

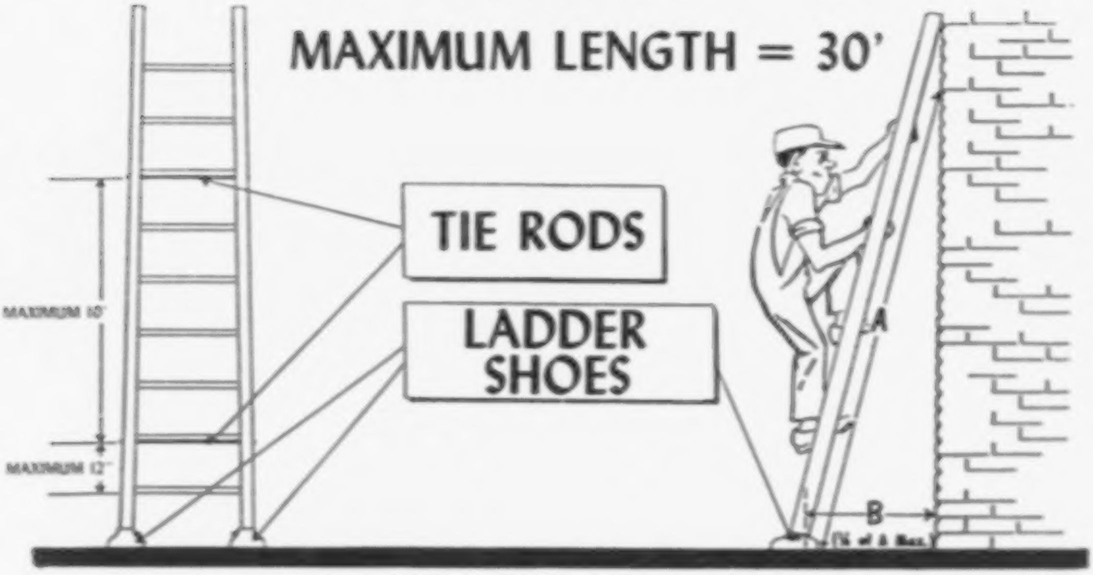
HIGHER LEVEL = HIGHER SEVERITY



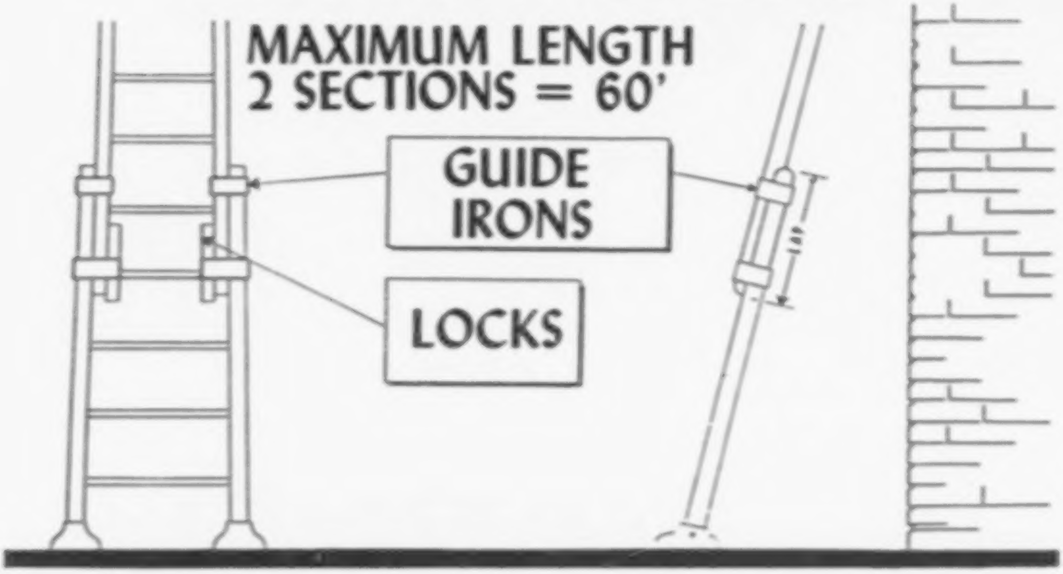
SAME LEVEL = LOWER SEVERITY



Portable Straight Ladder

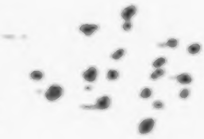

MAXIMUM LENGTH = 30'
TIE RODS
LADDER SHOES
MAXIMUM 10'
MAXIMUM 12"
A
A
B
(¼ of A Max.)

Extension Ladder


MAXIMUM LENGTH
2 SECTIONS = 60'
GUIDE IRONS
LOCKS

PRINCIPAL EYE HAZARDS

1. IMPACT OF FLYING PARTICLES



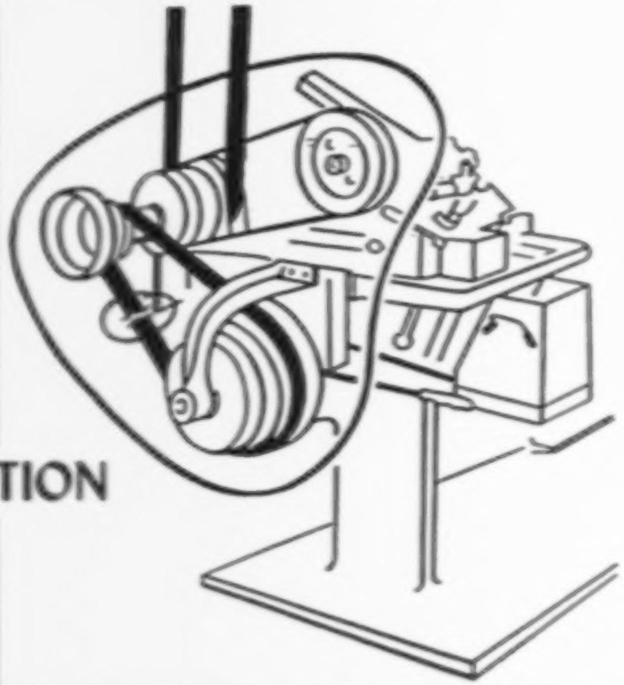
2. DUSTS

3. CHEMICAL FUMES & LIQUIDS

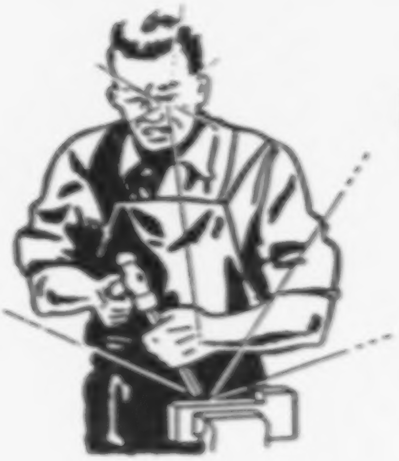
4. HOT SPLASHING METALS

5. INJURIOUS LIGHT RAYS

ACCIDENT CAUSES



UNSAFE CONDITION

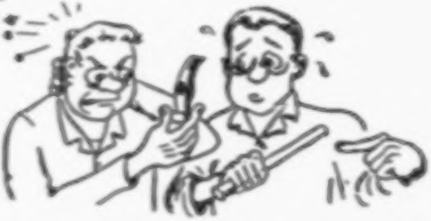


UNSAFE ACT

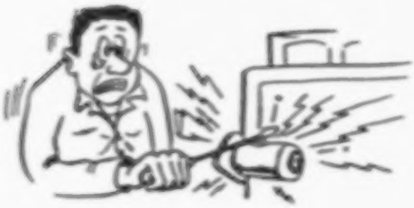
HAND TOOLS

CHIEF CAUSE OF HAND TOOL INJURIES

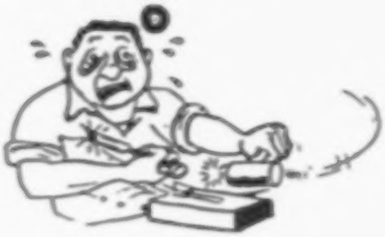
❶ DEFECTIVE TOOLS



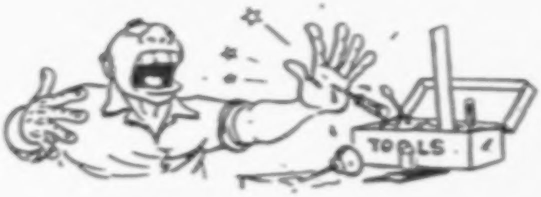
❷ WRONG TOOL FOR JOB



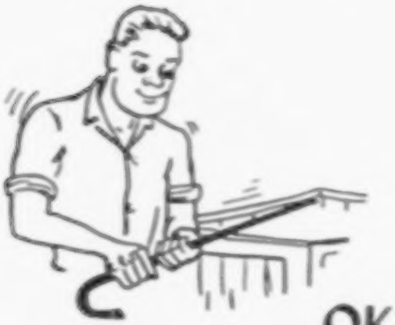
❸ INCORRECT METHOD



❹ BAD TOOL KEEPING



USE OF INCORRECT TOOL



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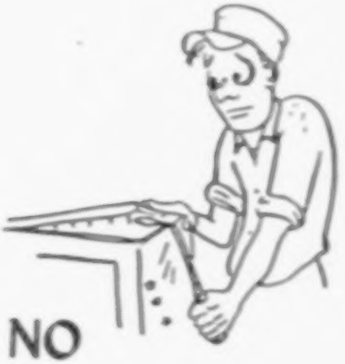

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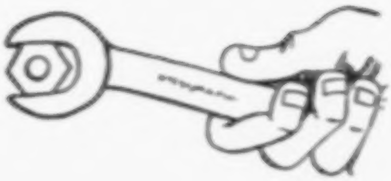

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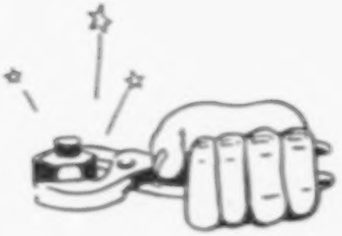
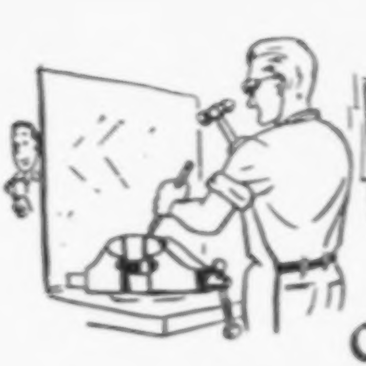


NO



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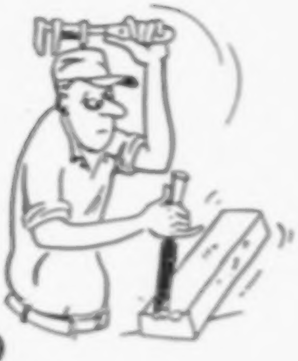
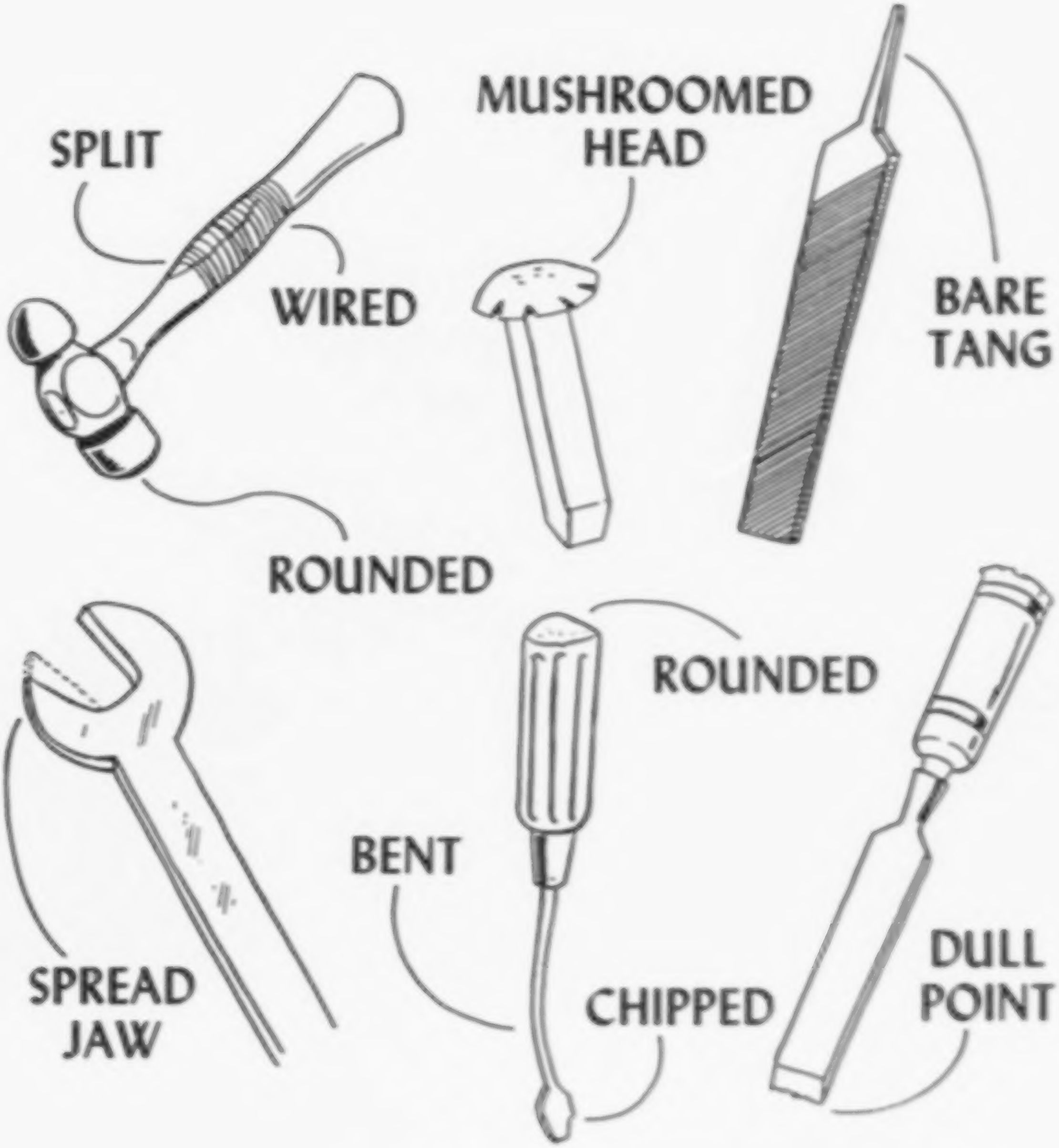
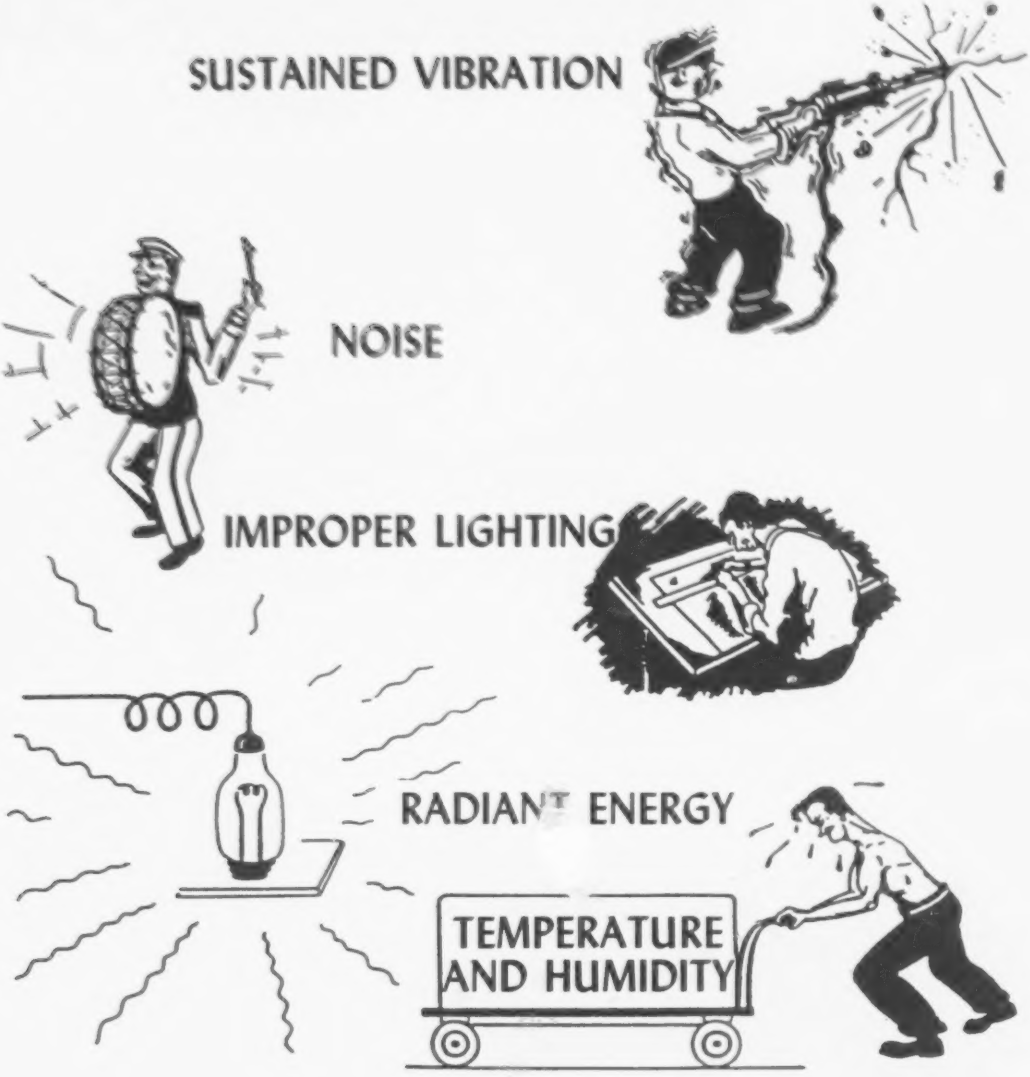


NO

SPECIFIC TOOL DEFECTS


SPLIT
WIRED
ROUNDED
MUSHROOMED HEAD
BARE TANG
ROUNDED
SPREAD JAW
BENT
CHIPPED
DULL POINT

HARMFUL ENVIRONMENTAL EXPOSURES



SUSTAINED VIBRATION

NOISE

IMPROPER LIGHTING

RADIANT ENERGY

TEMPERATURE AND HUMIDITY

LOW VOLTAGE CAN BE HAZARDOUS

FEW PERSONS
REALIZE THAT

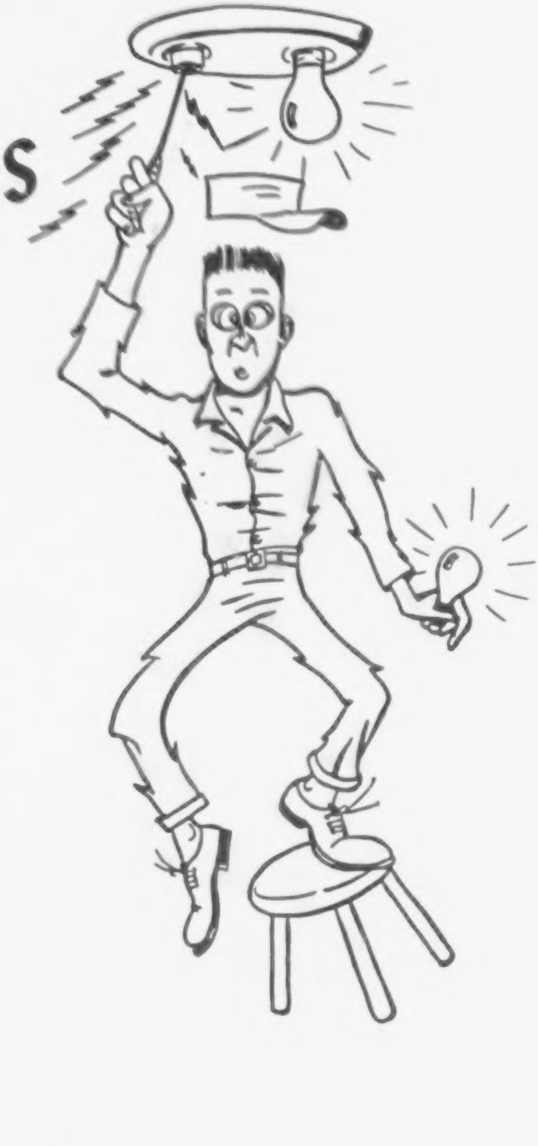
LOW VOLTAGES

CAUSE INJURIES

CAUSE DEATH

SO YOU SHOULD
KNOW . . . .

ELEMENTS OF SHOCK



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10.0 SAFETY SPECIFICATION FOR FACILITIES

- 10.1 Main Work Area or Laboratory
  - 10.1.1 Floor Area Valves for Main Work Area
  - 10.1.2 Flooring Materials Recommended for Use in Vocational Education Facilities
- 10.2 The Visual Environment - Color
- 10.3 The Visual Environment - Lighting
  - 10.3.1 Recommended Minimum Levels of General Illumination for Facilities
  - 10.3.2 Levels of Illumination for Various Kinds of Work
- 10.4 Sound Control
  - 10.4.1 Range of Sound - Level Intensity
  - 10.4.2 Permissable Noise Exposures
- 10.5 Ventilation
  - 10.5.1 Mechanical Ventilation Requirements

10.0 SAFETY SPECIFICATIONS FOR FACILITIES

The plans for vocational facilities can limit educational programs but well planned and safe facilities will not only enhance the day-to-day learning process but will also lead the way for launching new educational programs. This is important because our modern technological society is changing very rapidly necessitating the constant updating of instructional materials and learning environment.

Safety is of paramount concern in vocational educational facilities because of the nature of instruction and the specialized type of equipment in use. Specifically, concerns can be categorized into several areas:

10.1 MAIN WORK AREA OR LABORATORY

A complete laboratory complex consists of a main work area and one or more auxiliary areas. The size of the main work area is determined by two factors: the type of technical area to be housed and maximum class enrollment. The floor area value (expressed as a certain number of square feet per student) that is appropriate to the first factor multiplied by maximum class enrollment gives a total area within which it is always possible to achieve a valid arrangement of equipment. Table 10.1.1 illustrates suggested floor area values, and Table 10.1.2 shows recommended flooring materials for select vocational laboratories.

Table 10.1.1.

FLOOR AREA VALUES FOR MAIN WORK AREAS

Space Rating	Square Ft. Per Student (Main Work Area)	Total Sq. Ft. (Class Size of 24)
Light Laboratories-- Drawing, Crafts, Electricity/Electronics		
Minimum	50	1200
Good	70	1680
Excellent	90	2160
Heavy Laboratories-- Woods, Metals, Graphic Arts, Automotive, General		
Minimum	90	2160
Good	100	2400
Excellent	110	2640

TABLE 10.1.2

FLOORING MATERIALS RECOMMENDED FOR USE IN VOCATIONAL EDUCATION FACILITIES

Labaoratory or Auxiliary Area	Recommended Flooring Material
General Shop	Maple
Woods	Maple
Metals	Concrete
Crafts	Maple
Graphic Arts	Maple, Vinyl Asbestos, Vinyl, Concrete
Electricity/Electronics	Maple, Vinyl Asbestos, Vinyl
Drawing	Maple, Vinyl Asbestos, Vinyl, Concrete
Automotive Technology	Concrete
Class Area	Maple, Vinyl Asbestos, Vinyl, Carpet
Teacher's Office	Maple, Vinyl Asbestos, Vinyl, Carpet
Design Center	Maple, Vinyl Asbestos, Vinyl, Carpet
Laboratory Library	Maple, Vinyl Asbestos, Vinyl, Carpet
Demonstration Area	Same as main work area
Locker Area	Same as main work area
Project Area	Same as main work area
Project Storage Room	Same as main work area
Materials Storage Room	Same as main work area
Equipment Storage Room	Same as main work area
Project Assembly Room	Same as main work area
Toilet and Lavatory	Terrazzo, Ceramic Tile
Wash Area	Same as main work area
Finishing Room	Concrete
Darkroom	Concrete, Vinyl Asbestos, Vinyl, Carpet
Materials Testing Center	Maple

A well designed and safe facility should also have some combination of the following for each major vocational area: demonstration area, display area, student locker area, project storage area, materials storage room, equipment storage room, project assembly area, rest rooms, and a wash area. The intent of this section was not to present design detail but rather to bring awareness regarding the safe and adequate items for proper vocational instructional delivery. For this reason, no further information is provided on the construction of the physical plant with the exception of several environmental concerns.

10.2 THE VISUAL ENVIRONMENT - COLOR

For many years, industry has found that the application of color dynamics to both the interior of a building and equipment achieves numerous positive results. Likewise, the application of color dynamics to the vocational laboratory or work station has been found effective in:

1. Improving the student's attitude towards the learning environment.
2. Improving the appearance of the laboratory.
3. Reducing accidents through a safer environment.

The following color dynamic scheme should be considered in the organization of any facility to be used for vocational instruction:

1. Watch out - Focal Yellow striped with Black warns against falling, stumbling, and projecting hazards. Four-inch Focal Yellow stripes on floors mark traffic lanes and danger areas around machines.
2. On guard - Focal Orange. Warns against dangerous parts and areas on equipment. Included are electrical switch boxes, machine guards, the insides of fuse box and circuit breaker box doors, and the areas around crushing and cutting edges.
3. Fire protection - Red. Marks the location of fire fighting equipment and identifies individual pieces, such as fire extinguishers.

4. Out of Service - Blue. Blue disks are hung on pieces of equipment that are not to be used. "Out of order" is lettered in white on the blue background.

5. First Aid - Green. Marks the location of first aid supplies. A white cross on a green background further identifies a first aid cabinet. Entrances to first aid stations are identified by white crosses bordered with green.

6. Housekeeping facilities - White. Painted areas of floors indicate locations of waste receptacles. Temporary floor storage spaces are outlined by four-inch white stripes.

7. Pipe line identification
    a. Fire protection materials - red
    b. Dangerous materials - yellow or orange
    c. Safe materials - green, light gray, white, dark grey, black
    d. Protective materials - blue
    e. Extra-valuable materials - purple

10.3 THE VISUAL ENVIRONMENT - LIGHTING

The following items characterize a properly and adequately illuminated vocational education environment:

1. Light is properly and uniformly distributed throughout the laboratory or work station.

2. All shadows are eliminated on or near the working surface.

3. Glare is eliminated or reduced to a minimum.

4. There is a high degree of efficiency in seeing the necessary work or task with a minimum or effort on the part of the student.

5. There is a general lab environmental brightness which is agreeable and beneficial to students.

Levels of illumination are usually made in terms of foot-candle levels on working surfaces as measured by light meters calibrated and designed for this purpose. The tables that follow indicate the recommended levels of illumination for various kinds of vocational education facilities.

TABLE 10.3.1

RECOMMENDED MINIMUM LEVELS OF GENERAL ILLUMINATION FOR FACILITIES

Type of Facility	Footcandles at a Working Surface[a]
Laboratories	
Drawing	200
Metals	150
Woods	150
Crafts	200
Automotive Technology	150
Graphic Arts	150
General	150
Auxiliary Areas	
Design Center	200
Class Area	150
Teacher's Office	150
Demonstration Area	150
Laboratory Library	150
Student Locker Area	30
Project Storage Room	50
Materials Storage Room	30
Equipment Storage Room	50
Project Assembly Area	150
Toilet and Lavatory Room	30
Wash Area	30
Finishing Room	150
Darkroom	50
Materials or Equipment Testing Room	150

---

[a] Considered to be thirty inches above floor level.

TABLE 10.3.2

LEVELS OF ILLUMINATION FOR VARIOUS KINDS OF INDUSTRIAL WORK

Footcandles of Light Required	Example of Industrial Work
1. Above 300 ft. candles	*Very Fine Work: fine inspection, fine bench and machine work, watch and jewelry making
2. 150-300 ft. candles	*Moderately Fine Work: drafting, inspection, bookkeeping, leather cutting tables, etc.
3. 70-160 ft. candles	*Regular Close-Seeing Work: medium bench and machine work, regular office work, printing presses
4. 30-70 ft. candles	*Little Close-Seeing Work: rough bench and machine work, general production work, labeling, packing
5. 10-30 ft. candles	*Regular Seeing Work: stairway, corridors, washrooms, loading and unloading areas for materials

10.4 SOUND CONTROL

The control of sound is a persistent and complex problem in the vocational education laboratory. Sound control is vital from both the standpoint of safety and good instruction.

A multiplicity of factors will determine the problem of controlling sound: shape and size of the lab, shape and contour of the roof, building materials used throughout the building, and the type of paint used on furniture, machines and walls, to name a few. General acoustical treatment of the building is not the only solution to take care of sound control problems.

The following factors will contribute to better sound control in the vocational laboratory or facilities:

1. Rectangular shaped lab facilities are more conducive to sound control than are circular or irregular shaped buildings.
2. Pitched roofs reduce the problem to a minimum and improve sound control; arched ceilings compound the problem.
3. Acoustical tile on ceilings. (Asbestos tile may not be used).
4. Acoustical plaster on walls and partitions; acoustical treated pain on finished surfaces of walls, machines and furniture.
5. Solid partitions used throughout the lab when possible.
6. Isolation of noisy activities.
7. Substituting quiet operations for noisy operations when fabricating materials in the lab.
8. Enclosing noisy equipment: air compressors, exhaust systems, etc.
9. Use sound dampers on machines and equipment, air ducts, etc.

The following tables list the range of sound level intensity and permissable noise exposures as recommended for vocational education facilities.

TABLE 10.4.1

RANGE OF SOUND LEVEL INTENSITY

dB	Sound Source	Potential Hazards
150	Jet engine test cell	Pain and possible damage to ear
130	Riveting steel tank	
	Pneumatic rock drill	
	Pneumatic press (close range)	
125	Pneumatic riveter	
	Pneumatic chipper	
120	Threshold of pain	
112	Turbine generator	
	Sandblasting	
	Punch press	
110	Drop hammer	Dangerous
	Drills, shovels, trucks operating	
105	Riveting machines, pin routers	
	wire braiders, stranding machine	
	circular saw	
100	Can manufacturing plant	
	Automatic screw machine	
	Ram turret lathes	
	Portable grinders	
90	Portable sanders	Risky
	Engine lathes	
	Pneumatic diesel compressor	
	Milling machine	
	Weaving mill	
	Welding equipment	
	Hearing damage if exposure above this level is continued for an extended time	
80	Tabulating machines	
	Electric typewriters	
75	Stenographic room	
70	Electronic assembly plant	
60	Conversation	Safe

TABLE 10.4.2

PERMISSABLE NOISE EXPOSURES

Duration per Day, Hours	Sound Level dB[a]
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or less	115

[a] As measured on a scale of standard sound-level meter at slow response.

10.5 VENTILATION

The goal of an air control system is to provide an air environment that is odorless, has no harmful impurities, is at the proper temperature, and contains sufficient moisture. To achieve this goal, vocational laboratory air must be blended with outdoor air, filtered, heated or cooled, humidified or dehumidified, and kept gently in motion. Nature does all of these things well except where production of waster materials or the conditions prevent it but not consistently. Therefore it is necessary to employ mechanical systems to maintain a satisfactory air environment. The tools are at hand: mechanical ventilation and exhaust systems, heating and air conditioning equipment, and humidifying and dehumidifying devices. They are effective, as well as relatively inexpensive to install and operate. All that remains is to put them to use wherever possible.

The following table lists minimum mechanical ventilation requirements.

TABLE 10.5.1

MECHANICAL VENTILATION REQUIREMENTS

Laboratory	Outdoor Air Supply	General Exhaust	Capacity
Automotive	360 CFM/room	400 CFM/room	1.75
Graphics	360 CFM/room	400 CFM/room	1.75
Metal	360 CFM/room	400 CFM/room	1.75
Wood	360 CFM/room	400 CFM/room	1.75
Drafting	0.15	0.15	1.25
Electricity/ Electronics	0.15	0.15	1.25

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11.0 Fire Protection

11.1 Emergency Procedures
11.2 Building Evacuation
11.3 Notification and Training
11.4 Good Housekeeping
11.5 Extinguisher Use Training
    11.5.1 Types of Fire Extinguishers

11.0 FIRE PROTECTION

Everything necessary to start a fire is present in schools: FUEL such as gasoline, hydrogen generated during battery charging, packing and cleaning materials, paints and solvents, plastics, trash, and many other items; OXYGEN from the air; and IGNITION SOURCES, in the form of flames, sparks, heating systems, welding, hot metal, spontaneous combustion, and electrical equipment. The basic principle of preventing fire in your school is to keep these three elements separated.

Scheduled maintenance checks of electrical machinery and ventilation systems, good housekeeping, periodic facility inspection, and proper storage and disposal of combustible sweeping compounds, oil mops and rags, and flammable solvents rank as the best safeguards against fire. However, even the best maintained facility can have a fire.

Of primary concern in the event of a fire is the safe evacuation of people from the scene of the fire. Regardless of size, each school should be equipped with a fire alarm system and have an emergency evacuation plan in case of fire.

11.1 EMERGENCY PROCEDURES

In case of fire, make sure the local fire department is notified before any attempt is made to fight the fire, regardless of any arrangements made previously with the fire department.

While the fire department is being notified, an orderly evacuation from the facility should begin.

11.2 BUILDING EVACUATION

A plan for orderly evacuation should include the following:

1. An evacuation signal
2. A well-planned evacuation route for all areas of the facility
3. Designation of an assembly area for persons well away from the school

4. An accounting procedure for all persons after assembly (a daily list of those absent should be made to simplify accounting)

5. A search of the building to assure complete evacuation. Floor or area "wardens" should be designated to cover all areas.

11.3 NOTIFICATION AND TRAINING

1. A list of telephone numbers for local fire departments should be posted in prominent places throughout the school and all employees advised of this posting. (See Emergency Information on the inside back cover of local phone book.)

2. Floor plans for designated areas should be posted showing locations of fire alarm activators, fire extinguishers, and exits.

3. Several employees in each area of the facility should be trained in the use of fire extinguishers.

11.4 GOOD HOUSEKEEPING

Maintaining a clean and orderly school environmental will reduce the danger of fires. Combustible material of any type should be kept only in places which are isolated by fire-resistant construction.

Rubbish should be disposed of regularly. If it is necessary to store combustible waste materials, a covered metal receptacle is suggested.

The materials used for cleaning can also create hazards. Combustible sweeping compounds, such as oil-treated sawdust can be a fire hazard. Floor coatings containing low flash-point solvents can be dangerous, especially near sources of ignition. All oily mops and rags must be stored in closed metal containers.

Some common causes of fires in all schools are:

1. Electrical malfunctions
2. Friction
3. Open flames
4. Sparks
5. Hot surfaces
6. Smoking

Proper maintenance and frequent inspections through a safety program can reduce these hazards.

Not only does good housekeeping contribute to a safer workplace by reducing the potential for a fire, it also reduces accidents caused by slips, trips, and falls. Falls are one of the chief contributors to injury. Accumulations of waste and scrap and spills of slippery material (oil) must be cleaned up promptly so that they do not constitute a hazard.

Good housekeeping also contributes to increased safety during materials handling and storage. An orderly school with unobstructed aisles and passageways can significantly reduce injuries.

11.5 EXTINGUISHER USE TRAINING

Instructors and students should be trained in the use of portable fire extinguishers. Besides knowing how to operate extinguishers and how to apply agents effectively, they should be familiar enough with the equipment to know when a fire is beyond the capabilities of portable extinguishers.

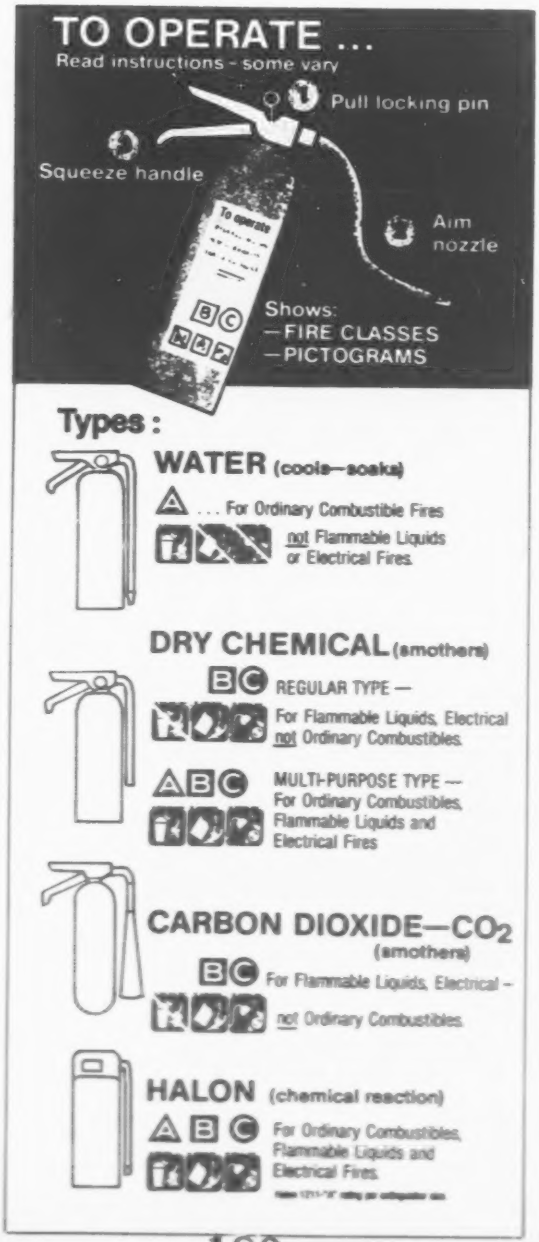
In all fire instruction, make sure that students understand:

1. Immediately evaluate the area after reporting fire to fire department.
2. Report all fires immediately giving address--and any additional important information.
3. Use the extinguisher, only as a last resort, or if the potential injury is minor.
4. Use a sweeping motion that extend at least six inches on each side of the near edge of the flames.
5. Maintain a proper distance from the fire to avoid splashing fuel or burning material.
6. Hold most portable units upright.
7. Attack flames at the fuel source.
8. Keep the extinguisher's agent flowing so that the fire cannot reignite.

Table 11.5.1 shows classification and uses of different types of fire extinguishers.

TABLE 11.5.1

TYPES OF FIRE EXTINGUISERS



TO OPERATE ...

Read instructions - some vary

① Pull locking pin

② Squeeze handle

③ Aim nozzle

Shows:
—FIRE CLASSES
—PICTOGRAMS

Types :

WATER (cools—soaks)

A ... For Ordinary Combustible Fires

not Flammable Liquids or Electrical Fires.

DRY CHEMICAL (smothers)

B C REGULAR TYPE —
For Flammable Liquids, Electrical
not Ordinary Combustibles.

A B C MULTI-PURPOSE TYPE —
For Ordinary Combustibles, Flammable Liquids and Electrical Fires

CARBON DIOXIDE—CO_2 (smothers)

B C For Flammable Liquids, Electrical – not Ordinary Combustibles.

HALON (chemical reaction)

A B C For Ordinary Combustibles, Flammable Liquids and Electrical Fires.

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12.0 Protective Gear

- 12.1 Head Protective Gear
- 12.2 Hand Protective Gear
- 12.3 Foot Protective Gear
- 12.4 Respiratory Protection
- 12.5 Eye Safety
  - 12.5.1 Voc Ed #199 Eye Protection Guide

12.0 PROTECTIVE GEAR

All students shall wear proper protective gear while working on any machinery in the shop for their personal safety. More than 100,000 disabling eye injuries are reported nationally every year and there are thousands of minor injuries which are not reported but cause a great deal of discomfort. Most of the injuries could have been prevented through the use of proper gear.

If you have any doubts about your eyesight, a simple test at your school dispensary might indicate a need for corrective glasses. You should have your vision checked periodically to insure yourself against needless accidents due to poor vision . . . DON'T take a chance.

If you are required to wear corrective glasses, do so at all times while you are in the shop. In addition, wear ANSI approved eye protection appropriate for the job or machine being used.

12.1 HEAD PROTECTIVE GEAR

12.1.1 TYPE OF JOB

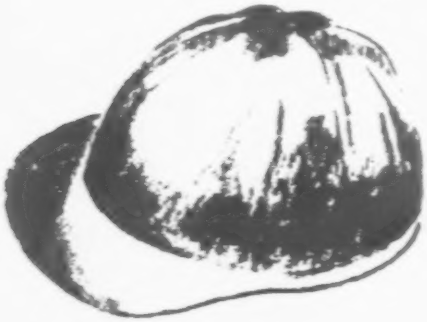
General industrial or construction type of jobs where falling or swinging objects are a hazard.

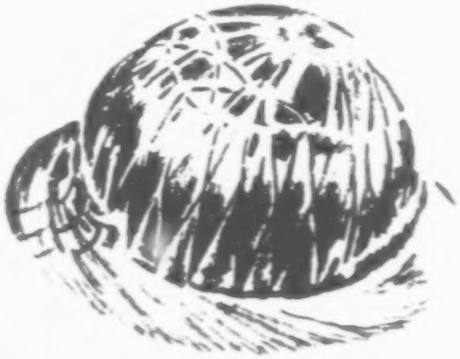
PROTECTION FROM

Falling or swinging objects, electrical shock in head area and act as a sunshade outdoors. Note that special headgear usually made of plastics such as Polycarbonate must be worn for protection against electrical shocks.

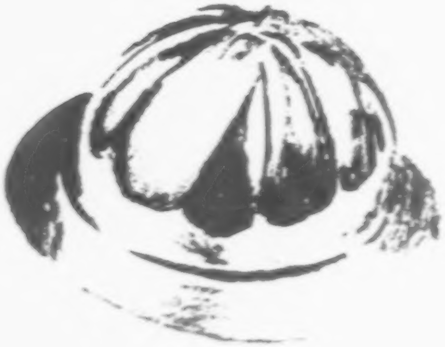
TYPE OF HEAD PROTECTION

High impact-resistant shell of aluminum, fiberglass, phenolic, or polycarbonate. Impact must be evenly distributed and absorbed with web suspension system. Federal specifications require 1 1/4" clearance between the wearer's head and the protective shell. Adjustable and comfortable webbing with perforated headband for coolness. A nape strap should be included to keep the headgear from falling off.





PHENOLIC



ALUMINUM

12.2 HAND PROTECTIVE GEAR

12.2.2 TYPE OF JOB

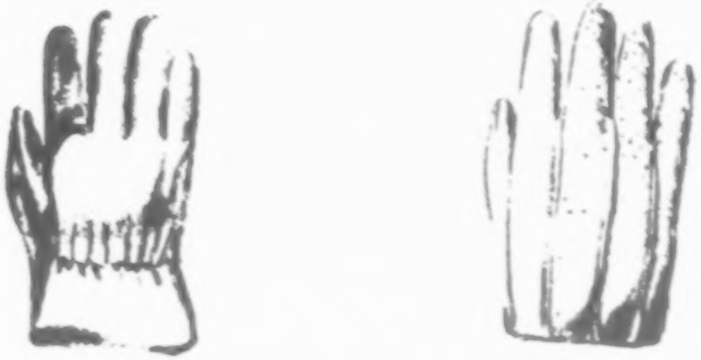
General industrial work including the handling of wood, metal, etc.

PROTECTION FROM

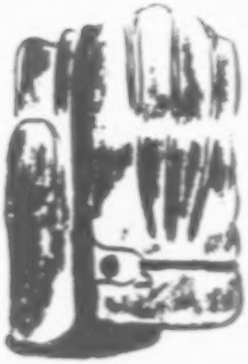
Cuts, splinters or blistering of hands.

TYPE OF HAND PROTECTION

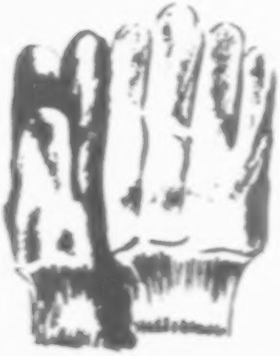
There is a variety of gloves to suit various conditions. Vinyl impregnated gloves provide a non-slip grip surface and excellent dexterity. Vinyl, rubber coated gloves also provide a non-slip surface but are usually too bulky for fabricating or assembling small parts. Flannel and leather gloves are also widely used for general industrial work. However leather gloves cannot be laundered.



VINYL-IMPREGNATED



LEATHER



FLANNEL

HAND PROTECTIVE GEAR (Cont'd)

12.2.3 TYPE OF JOB

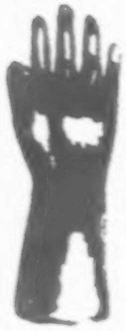
Working with or handling acids, caustics, alcohol, solvents, oil and grease.

PROTECTION FROM

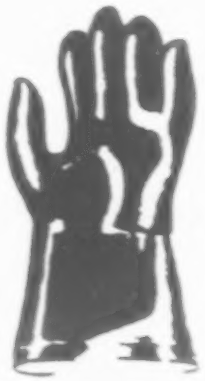
Chemical burns or skin irritation.

TYPE OF HAND PROTECTION

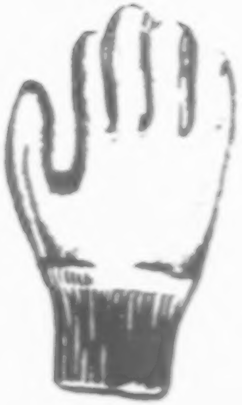
Neoprene gloves or various weights are widely used in this category. Lightweight neoprene gloves are used in food processing while heavy-duty types offer better protection for industrial work. Some types of vinyl or rubber coated gloves are also used for protection against chemicals. NOTE: Check solvents and recommended gloves.



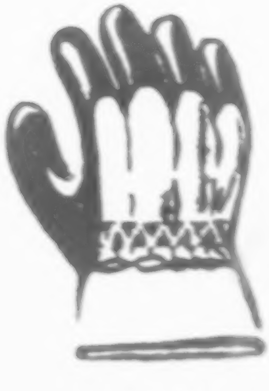
LIGHTWEIGHT NEOPRENE



HEAVY-DUTY NEOPRENE



VINYL-COATED



RUBBER-COATED

HAND PROTECTIVE GEAR (Cont'd)

12.2.3 TYPE OF JOB

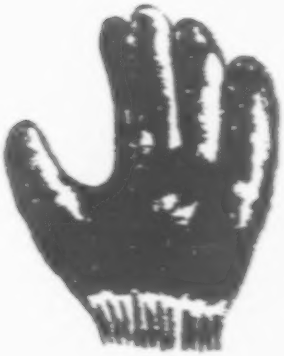
Grinding or sanding.

PROTECTION FROM

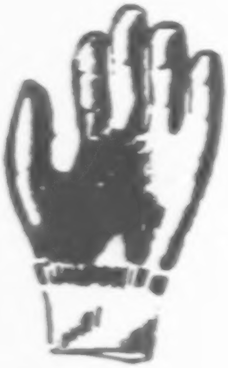
Abrasions.

TYPE OF HAND PROTECTION

Heavy-duty polyvinyl chloride (PVC) or neoprene gloves. Liquid-proof types of gloves offer protection against chemical burns.



NEOPRENE



POLYVINYLCHLORIDE (PVC)

HAND PROTECTIVE GEAR (Cont'd)

12.2.4 TYPE OF JOB

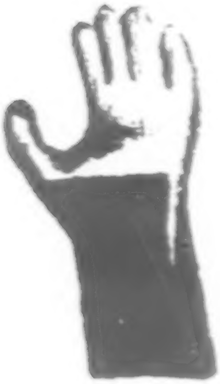
Foundry, forging, using kilns or ovens.

PROTECTION FROM

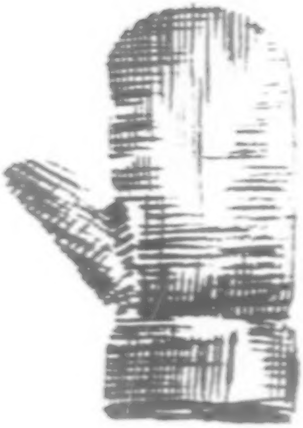
Heat.

TYPE OF PROTECTION

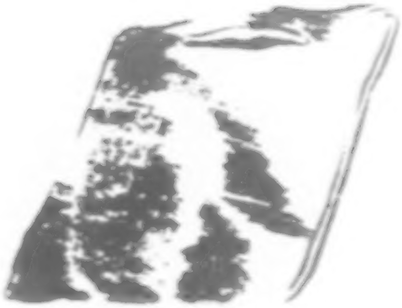
Heavy cotton knits or neoprene gloves. Some type of double-insulated neoprene gloves provide protection against cold also. Mitts, pads and gloves are convenient for brief handling of hot objects.



INSULATED NEOPRENE



MITT



PAD

HAND PAD

12.3 FOOT PROTECTIVE GEAR

12.3.1 TYPE OF JOB

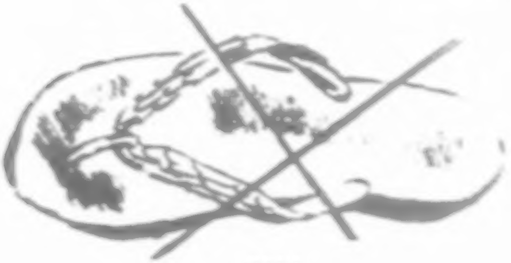
Students must wear shoes in the shop area at all times without exception. Cuts and punctures are common hazards which could be prevented by wearing proper footwear. "Zoris" and other type of slippers or sandals are not acceptable footwear for the shop. Any student who prefers to wear slippers to school should leave an old pair of shoes in the locker for shop use.

PROTECTION FROM

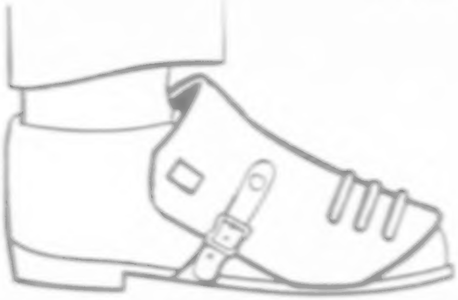
Heavy or sharp falling objects which might injure the top side of the foot. Punctures, splinters on the sole of the foot. Note that cleats shall not be worn on the sole of shoes. On smooth or wet surfaces cleats and other sole-saving devices could be hazardous.

TYPE OF FOOT PROTECTION

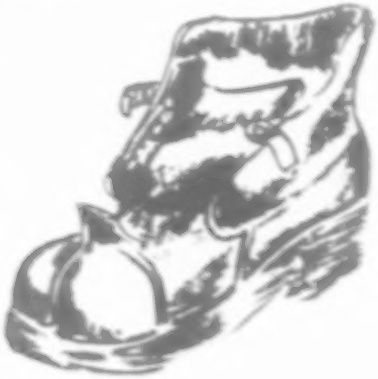
Shoes shall have leather or rubber type of sole with full leather or fabric covers for the entire foot up to the ankles. Canvas deck shoes or basketball shoes offer very little protection for the foot and should be limited to light work in the shop. Steel toe boots offer the maximum protection for the foot for most shop activities. Check with the teacher to be sure that you have the proper footwear for the job.



ZORI
(Not Acceptable)



STEEL COVER



STEEL TOE

12.4 RESPIRATORY PROTECTION

12.4.1 TYPE OF JOB

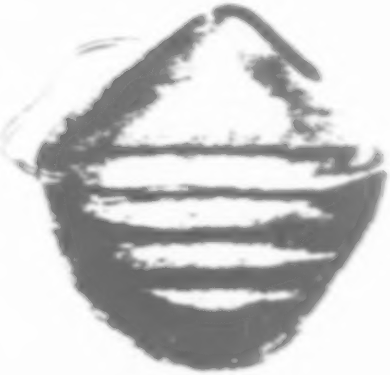
Spraying, sanding, cutting, grinding or any type of job where fumes, dust or other types of intoxicants are a hazard to the respiratory system.

PROTECTION FROM

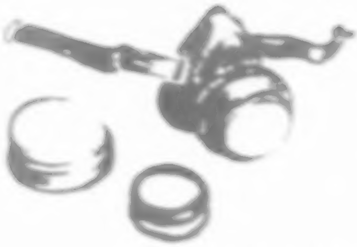
Damage to the respiratory system caused by dust, harmful fumes or vapors. There are some immature people who like to sniff or inhale intoxicating fumes just for kicks and permanently damage vital organs in their breathing system. Wear the proper type of mask, respirator, or filter for the job.

TYPE OF PROTECTION

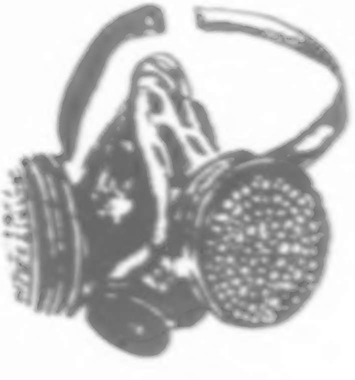
Synthetic rubber mask with adjustable headband and dual filter receptacles. Filters on better models can be changed for protection against various hazards such as dust, fumes, gases or paint sprays. Some simple types of paper--fabric masks are disposable after several uses. NOTE: Use correct filters for application.



FABRIC
(DUST PROTECTION)



ACTIVATED CHARCOAL
(PAINT SPRAY)



DUAL-CARTRIDGE
(MULTI-PURPOSE)

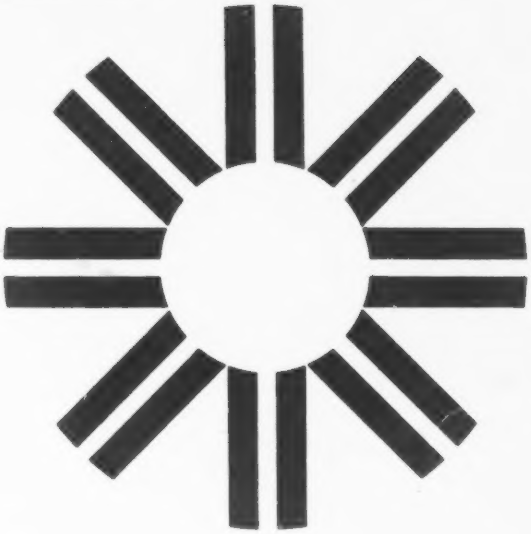
12.5 EYE SAFETY

Eye injuries are almost always preventable. Yet accidents resulting in vision damage or even blindness continue to occur in schools, at home and work, and at play. Each year hospital emergency rooms see an estimated 290,000 eye injures. Approximately 40,000 of these injuries result in permanent visual impairment.

Widespread use of eye protection has reduced the number of eye injuries in industry. Protective eyewear can have the same impact in schools. Unfortunately, too many educators learn this lesson only after an eye injury has already occurred. In the classroom strong emphasis should be placed on the benefits of eye protection before any potentially hazardous activities take place.

Voc Ed Guide #199 Eye Protection Guide informs educators of the Idaho requirements for eye safety in schools and how to carry out these responsibilities. Proper first aid measures for eye injuries are described.

Voc. Ed. #199



EYE

PROTECTION

guide

State Board for Vocational Education

STATE OF IDAHO
STATE BOARD FOR VOCATIONAL EDUCATION
LEN B. JORDAN BUILDING
650 W. STATE ST.
BOISE, IDAHO 83720

October, 1982

Dear Fellow Educator:

This guide has been developed and distributed for just one purpose: to protect the eyes of your students, your staff, and the visitors who come to see your activities.

A carefully planned, comprehensive eye safety program is a vital component in the practical learning activities essential to the education of many of our students. It is the only way to avoid needless and tragic accidents.

I hope you will urge everyone who participates in any school activities which could be hazardous to the eyes to use this manual and follow the directions in it. The gift of sight is a precious one. We must protect it in every way we can.

Because the prevention of blindness is a responsibility shared by many of us in the community, I am particularly pleased by the way this guide has been developed and distributed.

I enclose this guide and encourage its use.

Sincerely,

Larry Selland

Larry Selland
State Administrator

EYE PROTECTION

Douglas E. Hammer
Industrial Arts Supervisor

Stanley D. Sluder
Trade, Industrial & Technical Supervisor

October, 1982

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PREFACE

Eye injuries are almost always preventable. Yet accidents resulting in vision damage or even blindness continue to occur in schools, at home and work, and at play. Each year hospital emergency rooms see an estimated 290,000 eye injuries. Approximately 40,000 of these injuries result in permanent visual impairment.

Widespread use of eye protection has reduced the number of eye injuries in industry. Protective eyewear can have the same impact in schools. Unfortunately, too many educators learn this lesson only after an eye injury has already occurred. In the classroom strong emphasis should be placed on the benefits of eye protection before any potentially hazardous activities take place.

This guide informs educators of the Idaho requirements for eye safety in schools and how to carry out these responsibilities. Proper first aid measures for eye injuries are described.

Format and content for this guide have been adapted from the California Eye Protection Manual, to whom we offer sincere appreciation.

LEGAL RESPONSIBILITY FOR EYE SAFETY

Who Is Responsible For Enforcement Of Eye Safety?

Though there is an absence of any state law dealing with eye safety, it remains the responsibility of each local education agency to establish and maintain a safe learning environment for all personnel. Eye safety is a critical component of this responsibility.

It is the duty of superintendents, principals, and teachers charged with supervision of any class to require that eye protective devices be worn when the activity or a hazardous substance is likely to cause injury to the eyes. Enforcement must be an integral part of the instruction process of administrators, faculty, and students. Each staff member must be aware of responsibility for providing properly fitting eye protection and seeing that the devices are worn.

Who Provides Equipment?

The governing board of every school or community college district, the county superintendent of schools, and the administrative directors of every organization maintaining a private school have a duty to protect schools with industrial quality eye protection devices for the use of all students and teachers, and visitors. Eye protection devices may be sold to students and teachers at a price not to exceed the actual cost.

What Equipment Can Be Used?

Protective eyewear used in the schools must meet or exceed requirements of the American National Standard Practice for Occupational and Educational Eye and Face Protection.

When Is Protection Required?

Eye protective devices are required in any class or situation in which the activity or use of hazardous substances are likely to cause injury to the eyes.

Who Must Wear Eye Protection?

In addition to students and instructors, all visitors to eye hazardous areas must wear appropriate protective devices.

PURCHASE AND MAINTENANCE OF PROTECTIVE EYEWEAR

Purchase

The text of requests to bid should clearly specify that only devices which meet or exceed all requirements of the latest edition of the ANSI Z87.1 Standard are eligible for bidding. Meeting these standards is highly encouraged by the state of Idaho State Board for Vocational Education. Bidders should be required to state in writing that the Z87 Standard is being met.

How To Identify Protective Eyewear Equipment Meeting Requirements Of ANSI Z87.1-1979

Goggles (Dust and Chemical)

- Lens and frame must bear the manufacturer's trademark.
- The frame must be marked "Z87."

(Note: these types of goggles must not be used for any type of welding.)

Face Shield

- The plastic window as well as the headgear will bear the manufacturer's trademark and marked "Z87."
- For special operations where sparking may be a problem they will be permanently labeled "nonconductive" or "nonsparking."

(Note: face shields must be used in conjunction with goggles or type 5 or 6 spectacles.)

Welding Helmets or Goggles with Glass Lens or Lenses

- The filter plate must bear the shade number and the letter "H" (stands for heat-treated).

Laser Protection

- All laser eyewear must bear a label identifying the following:

(1) Laser wavelength
(2) Optical density
(3) Visible light transmission

See ANSI Z136.1-1980 for complete listing

- Check ANSI standard for lasers (Z136.1-1980) for more information. Also check with laser manufacturer for safety information.

Cleaning And Disinfecting

Thorough cleaning after every use is recommended. When protective eyewear is shared it must be disinfected between uses. The ANSI Z87.1-1979 requirements for disinfection are as follows:

Thoroughly clean all surfaces with soap or suitable detergent and warm water. Carefully rinse all traces of soap or detergent. Completely immerse the protector for 10 minutes in a solution of modified phenol, hypochlorite, quarternary ammonium compound, or other disinfection reagent, in a strength specified by the manufacturer of the safety equipment, at a room temperature of 20 degrees C (68 degrees F). Remove protector from solution and suspend in a clean place for air drying at room temperature, or with heated air. Do not rinse because this will remove the residual effect.

Ultraviolet disinfecting equipment may be utilized in conjunction with the preceeding washing procedure, when such equipment can be demonstrated to provide comparable disinfection.

Spray-type disinfecting solutions and bactericides may be utilized when such pressurized spray solutions can be demonstrated to provide comparable disinfection with the immersion procedure outlined above.

Protectors showing need for extensive cleaning should be disassembled to the extent possible without tools, prior to the washing and disinfecting procedure. Replace defective parts with new ones.

Replacement Of Parts

Pitted or scratched lenses reduce vision and seriously reduce protection. They should be discarded and replaced. Replace slack, worn out, or twisted headbands to hold eye protectors in proper position.

Replacement of lenses in plastic frames must be made from the front only. Replacement of lenses from the rear may destroy the capability of the frame to retain the lenses under impact.

Storage

Eye protectors should be stored in clean, dustproof containers or cases between uses.

Posting Eye Hazardous Areas

Entrance ways to all shops, laboratories, or other areas where industrial quality eye protection is required should be posted with a sign indicating the requirements.

In addition, machines, equipment, or areas requiring specific eye protection should be posted with warning signs.

GENERAL INFORMATION

Difference Between Industrial Quality Spectacles And "Impact-Resistant" Street Glasses

The table below illustrates the difference between Industrial Quality Spectacles and the Federal Food and Drug Administration (FDA) approved "Impact-Resistant" eyewear for streetwear use. Both standards apply to corrective and noncorrective glasses. Only industrial quality spectacles and frames meet Idaho recommendations.

Industrial Quality Spectacles ANSI Z87.1-1979 Standard do meet recommendations of Idaho School Eye Safety.	FDA-Approved "Impact-Resistant dress glasses do not meet Idaho Recommendations.
1. Lenses	1. Lenses
• Lenses have a minimum thickness of 3.0 mm and are specifically designated for industrial and educational use. • Lenses must be identified in a permanent manner with the manufacturer's monogram. • Lenses must be mounted in frames meeting ANSI Z87.1-1979 Standard.	• Streetwear lenses average 2.0 mm in thickness. • The FDA has no requirements for monogramming lenses. • ANSI Z87.1-1979 Standards prohibit mounting of FDA lenses, which do not meet ANSI Z87 impact tests, in ANSI Z87 frames.
2. Frames (Industrial Quality)	2. Frames (Street)
• Frames must be constructed of tough high-impact, slow-burning material, made to withstand severe impact and provide lens retention. • The fronts have the manufacturer's trademark and are marked Z87. The temples bear the Z87 mark, plus the temple size.	• Frame burning rate and lens retention requirements are not as stringent as the ANSI Z87.1 Standard. • Fronts and temples of the frames have no Z87 mark. (Note: ANSI Z87.1 lenses should not be mounted in this type of frame.)
3. Testing (Done by Manufacturer)	3. Testing (Done by Manufacturer)
• Glass and plastic lenses must resist shattering by a one-inch steel ball dropped from a height of 50 inches.	• Glass and plastic lenses must resist shattering by a ⅝-inch steel ball dropped from a height of 50 inches.

Phototropic (Photochromic) Lenses

Presently available phototropic lenses that change depth of tint when exposed to varying degrees of light must not be used as a substitute for approved industrial quality eye protection. They do reduce light transmission below acceptable levels for indoor work.

Also, they do not provide protection from hazardous ultraviolet or infrared radiation produced by some shop operations such as welding and foundry work.

Contact Lenses

Contact lenses are worn in many educational settings. However, when the educational environment entails exposure to chemical fumes, vapor, splashes, intense heat, molten metals, or very dusty atmosphere, use of contact lenses must be limited.

Contact lenses do not provide eye protection in the industrial sense. For use in eye-hazardous areas where contact lenses are permitted, they should be worn only in conjunction with appropriate industrial eye protection which meets or exceeds all requirements of ANSI Z87.1-1979 or later revisions.

A position statement on use of contact lenses in an industrial environment is available from the Society to Prevent Blindness.

Note: Industrial quality eye protection devices that meet the ANSI Z87.1-1968 Standard are still usable until they wear out. They must then be replaced with protection that meets the new ANSI Z87.1-1979 Standard or subsequent revisions thereof.

GENERAL INFORMATION

American National Standards Institute, Inc.

The American National Standards Institute, Inc. (ANSI) is a nonprofit organization that coordinates the voluntary development and maintenance of several thousand national consensus standards utilized by business and industry, governmental agencies, educational institutions, and others.

Standards for eye and face protection are published under the title, "American National Standard Practice for Occupational and Educational Eye and Face Protection."

Reference to ANSI eye and face protection standards is often abbreviated to ANSI Z87.1 followed by the date of the latest edition of the standards. At times this is further abbreviated to "Z87." "Z87" on major components of protective eyewear is permitted only when the entire device is in compliance with the standards.

Copies of the ANSI Z87.1-1979 Standards referred to in this manual may be purchased by writing the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.

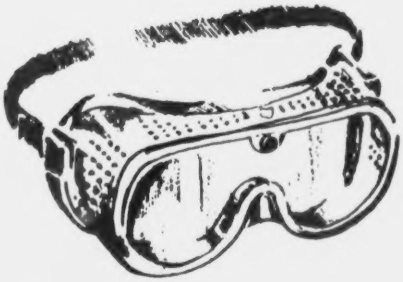
Eye Wash Equipment

Emergency facilities for quick eye drenching in case of chemical exposure (See page 13, First Aid) should be available. Students should be trained as to their location and use.

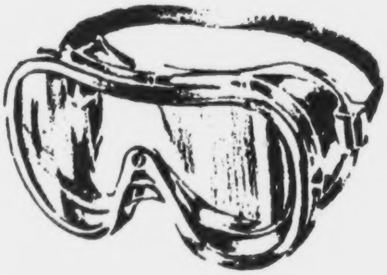
Inexpensive faucet-mounted eye wash fountains and portable units are available from safety equipment suppliers. Wherever school budgets permit, deck- or wall-mounted eye and face wash fountains and safety showers are advisable.

All such equipment should meet or exceed standards set by ANSI Standard 358.1-1981, "Emergency Eye Wash and Shower Equipment."

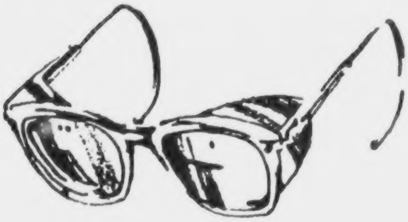
EXAMPLES OF PROTECTIVE EYEWEAR



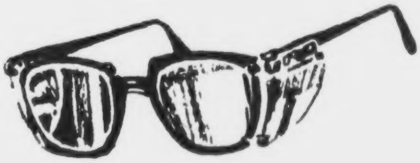
1. Goggles, Flexible Fitting Regular Ventilation



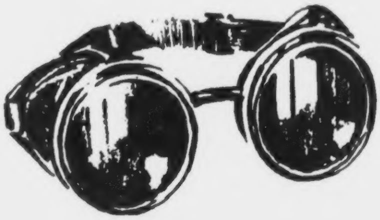
2. Goggles Flexible Fitting Hooded Ventilation



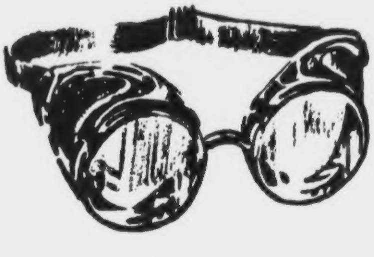
3. Spectacles, Plastic Frame, with Plastic Eyecup Sideshields



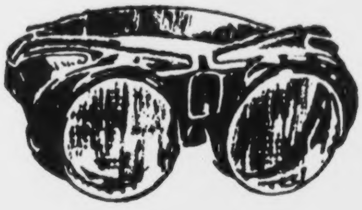
4. Spectacles, with Semi-Flat Fold Sideshields



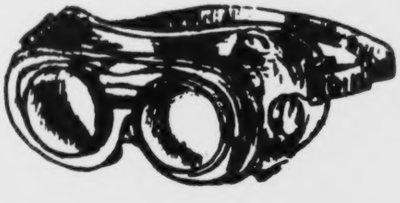
5. Welding Goggles, Eyecup Type, Tinted Lenses



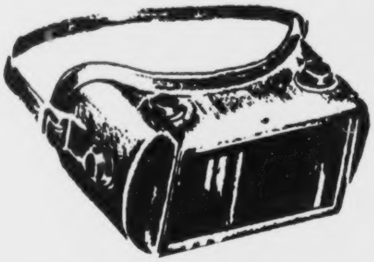
6. Chipping Goggles, Eyecup Type, Clear Safety Lenses



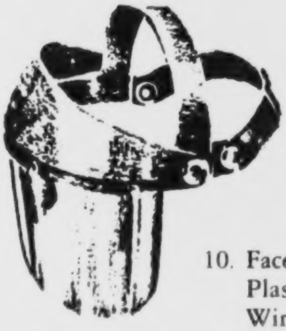
7. Welding Goggles, Coverspec Type, Tinted Lenses



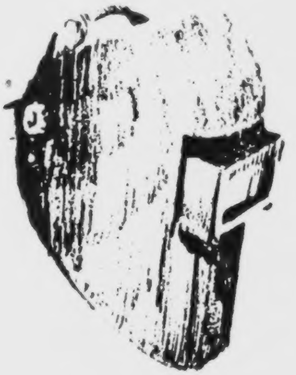
8. Chipping Goggles, Coverspec Type, Clear Safety Lenses



9. Welding Goggles, Coverspec Type, Tinted Plate Lens



10. Face Shield, Plastic or Mesh Window (See caution note below)



11. Welding Helmet

Caution:

- Face Shields alone do not provide adequate protection.
- Plastic lenses are advised for protection against molten metal splash.
- Contact lenses, of themselves, do not provide eye protection in the industrial sense (See page 5 on use of contact lenses).
- Safety glasses with metal frames must not be used while repairing electrically energized equipment. Electric shock may be possible.
- Spectacles without sideshields should not be used.

APPLICATION CHART

This Selection Chart offers general recommendations only. Final selection of eye and face protection devices is the responsibility of administrators, teachers, and safety specialists. (For laser protection, refer to American National Standard for Safe use of Lasers, ANSI Z136.1-1976 or later revisions).

Operation	Hazards	Protectors
Acetylene-burning Acetylene-cutting Acetylene-welding	Sparks, harmful rays molten metal, flying particles	5, 7, 9
Chemical handling	Splash, acid or base burns, fumes	2 (For severe exposure add 10.)
Chipping	Flying particles	1, 3, 4, 6, 8
Electric (arc) welding	Sparks, intense rays, molten metal	11 (In combination with 3, 4 in tinted lenses, advisable.)
Furnace operations	Glare, heat, molten metal	5, 7, 9 (For severe exposure, add 10.)
Grinding, light	Flying particles	1, 3, 4 (For severe exposure, add 10.)
Grinding, heavy	Flying particles	1, 6, 8 (For severe exposure, add 10.)
Laboratory	Chemical splash, glass breakage	2 (10 when in combination with 3, 4.)
Machining	Flying particles	1, 3, 4 (For severe exposure, add 10.)
Molten metals	Heat, glare, sparks, splash	5, 7 (10 in combination with 3, 4 in tinted lenses.)
Spot welding	Flying particles, sparks	1, 3, 4 (Tinted lenses advisable; for severe exposure, add 10.)

EYE PROTECTION IN PRIMARY GRADES

Identifying Hazards

Teachers' Criteria: Will it cut, scratch, burn, or bruise if propelled, spilled, blown, or splashed into the eyes.

List of a few of the materials and tools commonly used in activities which have potential eye hazard:

- Sand
- Paints and dyes
- Detergents
- Cleaning solvents
- Powders
- Drawing compasses
- Rocks
- Pencils
- Darts
- Glues and pastes
- Film developer
- Garden fertilizers
- Spray cans
- Hot wax
- Hot fat
- Arrows
- Screw drivers
- Electric tools
- Nails
- Hand tools
- Scissors
- Knives
- Sticks
- Putty knives
- Projectiles

Some of the activities which can hold eye hazard:

- Cutting
- Sawing
- Crushing rocks
- Gardening
- Hammering
- Punching holes
- Mixing paints and dyes
- Drilling
- Batiking
- Archery
- Fighting

Wearing Protection

Protective devices at the primary grade level should be flexible plastic goggles with hooded vents to protect from splashed or flying substances and blows from sharp or blunt objects as illustrated on page 7 protective eyewear device number 2. These can be obtained in children's sizes to assure good fit and comfort. The same kinds of goggles are suitable for teachers' use. All devices must meet requirements of the ANSI Z87.1 Standard.

It would be impossible and unnecessary to expect students to spend their day in safety goggles. Tight supervision and good safety teaching will go a long way in providing protection against eye injury. However, when a hazardous activity is under way in a classroom, all students should wear eye protection, since many accidents can result in injuries to students located at a distance.

Think Safety

Teach students about eyes and vision and how to protect both. Relate to sports. Teach caution and awareness of household dangers. Teach children and adults to read labels before using and note contents.

THE WISE OWL CLUB

Founded in 1947, the Wise Owl Club is an internationally recognized eye safety incentive plan to reduce needless and costly eye injuries and loss of sight by encouraging widespread use of proper eye protective equipment.

Establishing A Wise Owl Chapter

Simply complete and return an application form supplied by the National Society To Prevent Blindness, 79 Madison Avenue, New York, NY 10016. There is no charge for the charter. There need be no eligible members at the time of application for a school charter.

Wise Owl Club Membership

Membership is awarded only to those students, teachers, and employees whose eyesight is saved by wearing eye protection in an eye hazardous school situation.

Membership Fees

Club members pay no dues. Award materials for students, teachers, and school employees are free. Award materials for industrial employees are $5.00 per set.

Advantages to Your School of Establishing A Wise Owl Club

Wise Owl Club ceremonies in which membership awards are presented stimulate increased interest and awareness in your school of the importance of eye safety, and offer excellent public relations possibilities. Not only students but the community at large will be favorably impressed by news accounts of how school eye protective measures prevented eye injuries or loss of sight.

SCHOOL SAFETY COMMITTEES

In addition to forming chapters of the Wise Owl Club, schools can benefit from the experience of industry by appointing students to serve on safety committees. As a community service, safety engineers from local industries will often serve on school safety committees.

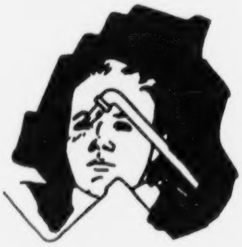
Members of the school safety committee should be instructed in eye and other areas of safety prevention and maintenance. All students should be taught to READ LABELS at school, work, and home to UNDERSTAND how products can be harmful.

PREVENT BLINDNESS

FIRST AID

For Eye Injuries Before Competent Medical Help Is Obtained

Chemical Splashes — Seconds count. Seconds, not minutes.



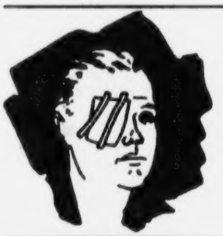
DO flood the eye with large amounts of clear water immediately from the inner corner of the eye to the outer corner. Use eyewash fountain or other appropriate source of aerated water or hold head under faucet or pour water into eye using any clean container. Keep eyelids open as widely as possible while flushing continuously and gently for at least 15 minutes.

Take victim to doctor as soon as possible.

DO NOT use eye cup.

DO NOT Bandage or apply salves, ointments or oils.

Cuts Or Punctures Of Eye Or Lid



DO bandage lightly and see a doctor at once.

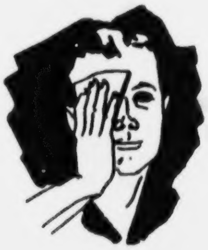
DO keep calm. Do not panic.

DO NOT wash out with water.

DO NOT try to remove object.

DO NOT try to remove blood clots.

Blows To Eyes

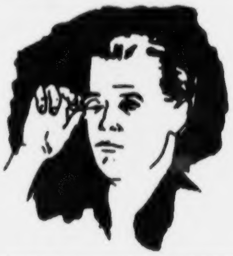


Discoloration (black eye) can mean internal damage to the eye.

DO apply cold compresses to reduce pain and swelling for 15 minutes, and again each hour as needed.

DO seek medical treatment.

Specks On The Surface Of The Eye



DO let tears wash out speck or particle.

DO lift upper lid out and down by the lashes over the lower lid.

DO take to a doctor as soon as possible if speck does not wash out.

DO NOT rub eyes.

NOTE: With any eye injury, no matter how slight, if there is continued pain, redness, swelling, or cloudiness of the surface, seek professional medical treatment.

Eye Protection Guide
State Division for Vocational Education
HB 366 12-3000 01 0000 110182

"The State of Idaho is an equal opportunity employer, does not discriminate or deny services on the basis of race, color, national origin, sex and/or handicap."

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13.1 SAFETY CONCERNS FOR VOCATIONAL HOME ECONOMICS PROGRAMS

13.2 INSTRUCTOR'S ROLE

1. Develop safety consciousness through teacher example.
2. Teach accident prevention with a positive approach by stressing the right way to perform an operation.
3. Give demonstrations emphasizing the safe use of hazardous utensils, machines, equipment, and materials.
4. Provide each student with general safety rules for the laboratory or learning site.
5. Use bulletin boards to display safety rules and regulations.
6. Send commendation letter to parents when students have exhibited interest in safety or successfully applied safety practices.
7. Require students to make careful observations of possible hazards in the laboratory.
8. Provide guest speakers to talk about safety and first aid.
9. Provide a safety suggestion box for the student's use.
10. Require students to sign information sheets dealing with safety rules and regulations to indicate they have read and understood the information.
11. Have students participate in accident investigation, reporting, and role-playing an accident to provide insight into the cause.
12. Emphasize the link between housekeeping and safety.
13. Provide convenient ways to remember correct and safe procedures for each assigned activity.
14. Require that fire exits are not blocked by equipment or supplies.

13.3 FOOD PREPARATION AREA

13.3.1 FACILITIES

1. Install non-porous surfaces on classroom counters and table tops. Keep all work surfaces free of cracks, or loose covering.
2. Provide a department that is clean, well painted, and adequately lighted and ventilated.
3. Arrange tools, storage facilities, and materials for orderly use and safety.
4. Replace wooden cutting boards with a molded plastic type; wooden boards are very unsanitary.
5. Place a guard around fan blades that are less than 7 feet from the floor.
6. Control pests by eliminating all possible entries for rodents or insects.
7. Provide moisture and fire proof waste containers and receptacles in convenient locations--empty regularly.
8. Repair breakage or malfunctions of equipment immediately.
9. Provide flat-bottomed and well-balanced cooking utensils with sturdy, securely attached handles; avoid using those with copper or cadmium plated interiors.
10. Avoid providing utensils which have sharp corners and raw, exposed edges.
11. Do not provide ceramic ware if the glaze is cracked.
12. Never use asbestos material.
13. Provide a 100% wool blanket and working fire extinguishers in the classroom or laboratory.

13.3.2 EQUIPMENT:

1. Follow microwave oven owner's manual instructions to assure safe usage.
2. Connect microwave ovens to a single circuit outlet.

3. Insure that horizontal dough mixers are equipped with a full enclosure over the bowl which is closed at all times while the agitator is in motion.
4. Provide guards on food grinder blades, choppers, and slicers.
5. Locate gas range away from a window.
6. Insure that gas ranges ignite from a pilot light or automatic ignition system.
7. Locate towel rack away from range.

13.3.3 MANAGER/TEACHER

1. Allow only authorized food handlers in the kitchen areas.
2. Prohibit horse play and practical jokes; they can be dangerous and are not allowed in the laboratory.
3. Insure awareness of emergency procedures and fire escape routes.
4. Practice fire drills regularly.
5. Discard cracked or chipped dishes and glassware; cracks can be dangerous and provide spaces for germs to collect and multiply.
6. Avoid placing boxes that have been on the floor on counter tops (shopping).
7. Sort and store cleaning agents and nonfood items separately from food items.
8. Store raw (uncooked) foods together and cooked foods together.
9. Avoid using an ingredient from an unmarked container.
10. Keep abreast of current information on the use and safety of appliances and equipment.
11. Inspect appliances and equipment regularly to be certain they are in safe, operating condition.

12. Make sure that cutting tools are properly sharpened and in good condition.

13. Discourage the use of extension cords.

14. Check for loose connection in appliances that have been bumped, dropped, or exposed to other mishaps.

15. Determine physical handicaps and limitations of students and/or employees so they are not assigned tasks which jeopardize their health and safety.

16. Prohibit floppy cuffs and loose jewelry to be worn while working in the laboratory.

17. Provide first aid supplies.

18. Instruct students with first aid information and practices.

13.3.4 PARTICIPANTS: STUDENTS/WORKERS

1. Practice proper use of fire extinguishing tools.

2. Keep hands free of oil and grease.

3. Read and follow directions when using all cleaning and laundering products.

4. Ventilate the area and avoid inhaling fumes when using cleaning products.

5. Never use chlorine bleach in combination with ammonia; deadly chlorine gas may be formed.

6. Take extreme care in using commercial oven cleaners; they are extremely caustic and may cause chemical burns.

7. Clean oven and broiler pan after each use to prevent accumulation of grease.

8. Clean, with hot water and disinfectant, cutting boards, meat slicers, grinders and utensils with wooden handles after each use so as not to contaminate food.

9. Clean exhaust hoods and ducts regularly.

10. Clean refrigerators routinely to prevent mold from growing.

11. Clean and return tools to the proper storage place.

12. Use hot water when washing dishes. Wear rubber gloves to protect hands from hot water.

13. Use a sponge or brush with a long handle to wash glass containers; never place hand directly in the glass itself.

14. Clean sharp cutting utensils individually to avoid cuts.

15. Place knives, blade first, in cutlery basket when using an automatic dishwasher.

16. Wipe up and clean up spilled food or trash immediately to avoid attracting pests.

17. Clean all food preparation surfaces before and after use.

18. Immerse dishes, glasses, and eating utensils in 170 degree water for at least two minutes to effectively sanitize them. If this temperature cannot be obtained, use a chemical sanitizing agent.

19. Control hair to prevent it from falling into food or catching in a rotary machine.

20. Scrub hands and fingernails thoroughly with soap and hot water after every trip to the toilet; body wastes are loaded with harmful bacteria.

21. Use a separate "hand wiping" towel. Do not use the same towel for wiping dishes, counters or hands.

22. Avoid fussing with hair or touching other body parts such as rubbing eyes or nose. If you do, scrub hands immediately.

23. Cover nose and mouth with a disposable tissue if you must cough or sneeze.

24. Avoid working with food if you have an open cut or sore.

25. Scrub hands after handling raw meat, fish, poultry, or eggs and before working with ready-to-eat food.

26. Follow the appliance operator's manual for safe operating and maintenance procedures.

27. Learn and follow the correct procedure for using each tool or piece of equipment.

28. Select the proper size and type of tool for the job.

29. Dry food thoroughly before deep-fat frying.

30. Fill the frying receptacle only 1/3 full of fat and carefully control the temperature when deep-fat frying.

31. Handle sharp-edged and pointed tools with care. Point edges away from yourself and other people while carrying and using these tools.

32. Turn handles of cooking utensils inward when being used on top of range and on work areas.

33. Match pot size with burner size.

34. Handle hot utensils with dry pot holders or mitts.

35. Follow direction exactly when using a pressure cooker or pressure sauce pan--proper release of steam is very important. A safety check of the cooker should be made yearly by an authorized tester (county extension home economist).

36. Use lifting tools (food tongs and turners) rather than knives to lift heavy foods.

37. Store cutting tools in protective holders or covers.

38. Use bowl locking devices on mixers so equipped.

39. Use a pushing device provided by the manufacturer to push food through the slicing and grinder machines.

40. Insert beaters of electric mixers in the mixer before plugging into the power source.

41. Keep hands dry and stand on a dry surface when using electrical appliances.

42. Grasp plug rather than cord when removing from outlet or appliance.

43. Disconnect cord from wall outlet before removing from appliance.

44. Insert cord into electrical appliance first, then into the wall.

45. Disconnect electrical appliances before cleaning.

46. Disconnect toasters before using any utensils to remove a piece of toast.

47. Avoid using an electric blow dryer to defrost a refrigerator.

48. Do not submerge electrical appliances in water--unless they are clearly identified immersible.

49. Avoid using electrical appliances and cords near water or where they could accidentally fall into a sink while connected.

50. Turn off gas before cleaning a gas range.

51. Report the smell of gas immediately.

52. Locate the main gas cut-off valve and know how to turn it off.

53. Do not place a towel, pot holder, or other fabric on an electrical heating element at any time.

54. Do not place cooking containers that are hot where others may come in contact with them.

13.4 CLOTHING CONSTRUCTION AREA

13.4.1 FACILITIES

1. Equip each sewing machine with a permanently attached guard so that operator's fingers cannot pass under the needle.
2. Provide adequate electric circuits and outlets.
3. Never use asbestos material.
4. Provide non-flammable or heat resistant ironing board covers.
5. Provide a well-balanced, rigid ironing board.

13.4.2 TEACHER/MANAGER

1. Determine physical handicaps and limitations of students and/or employees so they are not assigned tasks which jeopardize their health or safety.
2. Prohibit floppy cuffs and loose jewelry while working in the laboratory.
3. Keep department in workable order--the general area should be clean, orderly, and well painted, with adequate lighting and ventilation.
4. Arrange tools, storage facilities and equipment for orderly use and safety.
5. Keep aisles between machines clear.
6. Prohibit horse play and practical jokes.
7. Keep abreast of current information on the use and safety of appliances and equipment.
8. Insist that workers have clean, dry hands to prevent soiling or damaging fabric and to reduce the chance of electric shock.
9. Do not allow food or drinks at or near machines and word areas.
10. Replace burned out light bulbs immediately.

11. Check for loose connections in appliances that have been bumped, dropped, or exposed to other mishaps.
12. Arrange the electric cords of the sewing machines so they will not cause anyone to stumble.
13. Discourage use of extension cords.
14. Inspect all appliances and equipment regularly to be certain they are in safe condition for operating.
15. Repair breakage or malfunctions of equipment immediately.
16. Clean machines after ten hours of use. Brush out lint each day.
17. Practice fire drills regularly.
18. Insure awareness of fire escape routes and other emergency procedures.
19. Know where they are and practice proper use of the fire extinguisher.

13.4.3 PARTICIPANTS: STUDENTS/WORKERS

1. Instruct student with first aid information and practices. Provide first aid supplies.
2. Follow the operator's manual for each appliance for safe operating practices and maintenance.
3. Use erect, comfortable posture at the sewing machine to prevent fatigue, reduced efficiency, and accidents.
4. Avoid putting excessive weight or pressure on sewing machine cabinet.
5. Close the sewing machine carefully to avoid damaging electric cord, motor, or cabinet.
6. Insert cord into electrical appliance first, then into wall outlet.
7. Grasp plug rather than cord when removing from outlet or appliance.

8. Store shears and other sharp tools in holders or in a secure place.
9. Handle sharp-edged and pointed tools with care. Point edges away from yourself and other people while carrying and using these tools.
10. Avoid sewing over pins.
11. Place pins and needles in pin cushion or magnetic pin case.
12. Turn off sewing machine motor when not in use--when threading, replacing the needle, changing the bobbin, or when repairs are being made.

13.5 CHILD CARE LABORATORY

13.5.1 FACILITIES

1. Provide safe play equipment in repaired condition.
2. Arrange and maintain both indoor and outdoor environments for safety.
3. Provide first aid supplies for the child care center, and have these ready in case they are needed.
4. Cover with guards, unused electrical outlets that are in the reach of the children.
5. Provide sufficient moisture and fire proof waste containers and receptacles in appropriate locations--empty regularly.
6. Store in an easily accessible place--a 100% wool blanket for extinguishing fires.

13.5.2. TEACHER/MANAGER

1. Concern for the safety of the child is of primary importance when caring for children.
2. Keep department in workable order: the general area should be clean, orderly, and well painted, with adequate lighting and ventilation.
3. Arrange tools, storage facilities and materials for orderly use and safety.
4. Recognize and report signs of child abuse or neglect.
5. Determine the physical handicaps and limitations of students and/or employees so they are not assigned tasks which jeopardize their health and safety.
6. Plan activities that are appropriate for the developmental level of the child.
7. Prohibit horse play and practical jokes.
8. Provide supervision to protect children against hazards they may fail to recognize.

9. Enforce safety rules.
10. Summarize state, local, and funding agency guidelines regarding safety in the child care center.
11. Store potentially hazardous equipment and supplies away from where children are present.
12. Recognize and remove poisonous plants from the child care environment.
13. Prepare and use a child care center safety checklist daily, monthly, and seasonally.
14. Check children's indoor and outdoor play areas for safety hazards.
15. Model for and guide children in the safe use of equipment.
16. Guide the children in developing safety habits.
17. Explain procedures to follow in the case of a serious accident.
18. Explain procedures to follow for recording accidents and injuries.
19. Post emergency numbers near the telephone.
20. Keep abreast of current information on the use and safety of appliances and equipment that may be used in the child care laboratory.
21. Inspect appliances and equipment regularly to be certain that they are in safe condition for operating or use.
22. Discourage the use of extension cords.
23. Instruct all workers with first aid information and practices.

13.5.3 PARTICIPANTS: STUDENTS/WORKERS

1. Use accepted procedures to care for minor injuries to a child or personnel.
2. Use emergency care procedures when caring for children.

3. Explain and use fire prevention procedures in the child care center.
4. Practice procedures for evacuation in case of fire.
5. Practice proper use of fire extinguishing tools.
6. Utilize good safety practices at all times. Special attention should be given to severe weather.
7. Recognize signs of allergic reaction in a child.
8. Inspect toys regularly for safety.
9. Handle sharp-edged and pointed tools with care. Point edges away from yourself and other people while carrying and using these tools.

13.6 HOME ECONOMICS OCCUPATIONS

Safety Practices for Programs in Training for Occupations Related to Home Economics

This program provides instruction through in-school education and placement in actual employment situations in an area compatible with the student's interests and abilities. Safety practices and standards for these programs coincide with laboratory safety practices. All safety rules and regulations apply to in-school and on-the-job vocational programs in the areas of:

Food Preparation and Service
Clothing and Needle Trades
Child Care Services

13.7 BUSINESS SAFETY

What's Safety - "Freedom from danger or hazards"

13.7.1 SAFETY - ACCIDENTS COST YOU:

1. Money
    a. Loss of wages
    b. Medical bills
    c. Higher insurance
2. Others
    a. Bumps and bruises, sometimes permanent disability or death
    b. Worry to family
    c. Extra work to fellow workers

Poor Safety Attitudes are the biggest hazards in most offices and businesses.

1. Cynicism - Safety is kid stuff.
2. Fatalism - I can't do anything to stop accidents.
3. Showing off - Watch me.
4. Laziness - It's just too much trouble.
5. Temper - I'll do it my way or else!
6. Forgetfulness - I meant to, but I forgot.
7. Recklessness - Danger is the spice of life.
8. Overconfidence - I never get hurt.
9. Ignorance - I didn't know it would blow up if I lit match.

13.7.2 BUSINESS SAFETY IS YOUR PERSONAL RESPONSIBILITY

1. Come to school or work relaxed
    a. Good health is a safety plus.
    b. Fatigue is a frequent factor in accidents.
2. Know and follow the safety rules for your job.

   - a. Be familiar with the operation of all machines you use.

3. Watch out for the practical joker

   - a. Clowning is a major cause of mishaps.

4. Know what to do in an emergency

   - a. First Aid
   - b. Fire Procedures

13.8 SAFETY RULES FOR BUSINESS DEPARTMENT

USE AISLES -Avoid between-desk short cuts; typewriter cords may trip you.

KEEP THE FLOOR CLEAN - Even something as small as a pencil can cause someone to trip.

AVOID TRIPPING ON ELECTRIC OUTLETS AND CORDS - Some outlets stick up about an inch from the floor and some cords are on the floor.

WATCH YOUR STEP - Don't read while walking.

KEEP CHAIRS FLAT - Tilting back in a chair often results in overbalancing and a fall.

TURN MACHINES OFF - Every day when class is over.

BE ALERT FOR ELECTRICAL HAZARDS - If a machine overheats or smokes, turn it off and unplug it. When unplugging electrical cords, pull plug (hard rubber end), not cord.

PAPER CUTTER - Keep fingers away from blade.

SCISSORS - Use carefully and only as intended for cutting.

STAPLER - Keep fingers away from end, especially when jammed.

DO NOT REACH INSIDE MACHINES.

DOORS, DRAWERS, CUPBOARDS AND STORAGE AREAS - Close carefully to avoid shutting on yours or someone else's fingers.

CONTACTS OR JEWELRY - If you drop anything in a machine, turn machine off and ask teacher for assistance.

HAIR - Avoid getting it caught in machines.

DO NOT MOVE TYPEWRITERS OR OTHER CLASSROOM MACHINES

REPORT MACHINE PROBLEMS AS WELL AS BROKEN ELECTRICAL SOCKETS AND/OR CORDS - Do not handle it yourself.

NO HORSEPLAY - Shoving, running, pulling someone's chair or grabbing paper out of machine.

DUPLICATOR FLUIDS AND LIQUID PAPER - Follow instructions on containers. Do not sniff liquid paper, it could stop your heart.

DO NOT STRIKE MATCHES IN OR AROUND DUPLICATOR FLUIDS OR OTHER FLAMMABLE OBJECTS.

13.9 MARKETING AND SAFETY

The safety of workers and customers has always been a concern to the marketing field. Accidents cost business/industry an enormous sum of money each year. Accidents are due to mechanical, physiological or psychological causes.

Mechanical causes of accidents include unguarded equipment, defective equipment, slippery floors, obstructed work areas, and improperly stacked and stored merchandise. Proper care by employees and management will usually eliminate this cause.

Physiological causes of accidents are long hours of work, inadequate lighting, tasks that are dull and monotonous, and the like. These causes cannot always be eliminated, but they can be reduced by the maintenance of proper working conditions.

Psychological causes of accidents include stress, carelessness and lack of proper training. Workers and management must cooperate on improving safety to eliminate these causes.

Regular inspection of equipment, working conditions and employee attention will help reduce accidents. Employees themselves are one of the most important sources of safety suggestions. Without cooperation between management and employees, there cannot be a successful safety program.

In Idaho, there are safety regulations covering business and industry. The Occupational Safety and Health Act (OSHA) ensures safety rules and regulations are followed at the federal level, and the Idaho Industrial Commission works with business from the state level. Business and industry have developed effective safety programs and every employee should refer to their employer's specific safety procedures.

A safe environment is an essential part of a quality marketing education program. The following are considerations when inspecting safety conditions in the Marketing Education classroom and store/laboratory.

1. Store, classroom and storage areas are free of:
    a. Sharp edges (also check for burrs on desks, file cabinets, shelves and counters);
    b. pulled-out drawers;
    c. obstructing materials (i.e. extension cords, school supplies, hanging lights and display materials);
    d. protruding and poorly stacked merchandise or stock;

   e. display overhangs;
   f. litter on floor, tables, counters, shelves, desks;
   g. defective glass counters that may be chopped, cracked or with uneven edges--durable synthetic surfaces are free from this trouble;
   h. fire-hazard waste baskets--insufficient non-combustible containers are used;
   i. carpet or rugs are properly installed to prevent tripping; and
   j. are secured with lock and key.

2. Heavy fixtures or merchandise which might fall and cause injury are secured or placed at floor level.

3. Fixture glass is tempered (i.e., to avoid easy breaking of display case or counter tops upon sudden impact with hard objects.

4. Proper ventilation and/or exhaust is provided for sign making machine, duplicating equipment, cleaning supplies and other required areas.

5. Carefully check spring-loaded typing desk before opening to avoid the typewriter table snapping out.

6. Avoid standing on a stool with casters or other unstable furniture. Check brake on rolling ladder and ensure ladder is stable and safe.

7. Avoid carrying excessive loads or stacks as to impair vision or strain back. Use proper lifting method when picking up an item.

8. Pencils, pens and other sharp items are not stored in a glass container with points outward.

9. Avoid working close to knives or scissors with the point or sharp edge toward the worker--no knives or scissors are left on a work surface with the point toward the user; also, always hand a pointed instrument to another person with the point away from the recipient.

10. All paper cutters have a guard, and when not being used, the cutter arm is down and locked.

11. Drawers on desks and file cabinets have safety stops--avoid stepping near open drawers.

12. No spindle (spike) file is allowed.
13. Heating, lighting, ventilation, electrical work, and sound control meet state and federal standards.
14. Adequate storage area should be provided to house display materials, merchandise and teaching equipment when not in use.

APPENDIX

CONTENTS

A.1 Glossary of Terms
A.2 Safety Resources Directory

A.1 GLOSSARY OF TERMS

AIHA - American Industrial Hygiene Associate.

ANSI - American National Standard Institute.

ASSE - American Society of Safety Engineers.

BEARING - A machine part in which a journal, pin, or other part. The purpose of any type of bearing is to reduce friction.

BEARING RACE - The shell structure in direct contact with the bearing.

COOPERATIVE EDUCATION - A program for persons enrolled in a school and who, through a cooperative arrangement between school and employers, receive part-time vocational instruction in the school and on-the-job training through part-time employment.

FREON - Trade name for a family of synthetic chemical refrigerants manufactured by DuPont De Nemours, Inc.

ISC - Idaho General Safety & Health Standards Ed.

LASER - A device which produces an intense, coherent, directional beam of light by stimulating electrons or molecular transitions to lower energy levels. An acronym for Light Amplification by Stimulated Emission of Radiation.

SAFETY - Freedom from danger, injury, or damage.

SAE - Society of Automotive Engineers.

SME - Society of Manufacturing Engineers.

A.2 SAFETY RESOURCES DIRECTORY

AAVIM
American Association for Vocational
Instructional Materials
Engineering Center
Athens, Georgia 30602

Catalog has a complete listing of safety publications in all areas of Vocational Education.

ABC Manufacturing
Box 401
Raleigh, MS 39153

American Chemical Society
1155 16th Street, N.W.
Washington, D.C. 20036

This society has a committee on chemical safety.

American Gas Association
1032 East 62nd Street
Cleveland, OH 44103

American Industrial Hygiene Association
210 Haddon Avenue
Westmont, NJ 08108

This association will furnish names of industrial hygienists in your area.

American Insurance Association
Engineering and Safety
85 John Street
New York, NY 08108

American Iron and Steel
150 East 42nd Street
New York, NY 10017

American Legion
700 North Pennsylvania St.
Indianapolis, IN 46206

American Medical Association
Department of Occupational Health
535 North Dearborn Street
Chicago, IL 60610

This association has many pamphlets on occupational health subjects.

American Mutual Insurance Alliance
Accident and Fire Prevention Department
20 North Wacker Drive
Chicago, IL 60606

American National Standards Institute
1430 Broadway
New York, NY 10018

Many standards set by this organization were adopted as OSHA's initial standards.

American National Red Cross
Safety Services
17th & D Streets, N.W.
Washington, DC 20006

This organization has developed training programs that will help your establishment meet the first-aid requirements listed in the standards.

American Optical Corporation
14 Mechanic Street
Southbridge, MA 01550

Free eye safety posters and brochures.

American Petroleum Institute
Safety and Fire Protection Services
1271 Avenue of Americas
New York, NY 10020

American Public Health Association
1740 Broadway
New York, NY 10019

A committee of this association deals with injury control and emergency services.

American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 19103

This society sponsors research in the properties of engineering materials and develops standards, including specifications and test methods.

American Society of Safety Engineers
850 Busse Highway
Park Ridge, IL 60068

The society promotes and develops educational programs for safety training and conducts research in safety areas.

American Vocational Association
Special Publications
2020 North 14th Street
Arlington, VA 22201
Phone: 703-522-6161

Offers a listing of safety publications in all areas of vocational education.

American Welding Society
345 East 47th Street
New York, NY 10017

Canadian Consul General
500 Boylston Street
Boston, MA 02116

Channing L. Bete
45 Federal Street
Greenfield, MA 01301

Compressed Gas Association
11 West 42nd Street
New York, NY 10036

DCA Education Products
4865 Stenton Avenue
Philadelphia, PA 19144

Delaware Safety Council
300 Foulk Road
Wilmington, DE 19803

The state branch of the National Safety Council, the largest organization in the world devoted to the prevention of injury. Accident prevention material and programs are available through the Council.

Direct Safety Company
P. O. Box 8018
Phoenix, AZ 85066

Safety equipment and supplies for all areas of vocational education.

Edison Electric Institute
750 Third Avenue
New York, NY 10017

Employers Mutual of Wausau
Safety and Health Services Department
P. O. Box 8017
Wausau, WI 54402-8017

ERIC Document Reproduction Service
Ohio State University
1560 Kinney Road
Colubmus, OH 43210

Request: "on demand order blanks for safety literature"

General Motors
Educational Arts
G. M. Building
Detroit, MI 48202

Hobar Enterprises, Inc.
Hobar Publications
1305 Tiller Lane
St. Paul, MN 55112

Human Factors Society
P. O. Box 1369
Santa Monica, CA 90406

This society will help in the referral of human factors specialists upon request.

Idaho Department of Labor and Industrial Services
Safety and Labor Relations Bureau
317 Main, Room 400
Boise, ID 83720

16mm safety films related to most industrial areas.

Idaho
(Northern)
Inland Empire Chapter
P. O. Box 3266
Terminal Annex
Spokane, WA 99220

(Southern)
Snake River Chapter
P. O. Box 8673
Boise, ID 83707

Idaho State Insurance Fund
317 Main Street
Boise, ID 83720
Attn: Monroe Gallaher

Free safety posters and brochures.

Industrial Hygiene Foundation of America
5231 Central Avenue
Pittsburgh, PA 15232

Will assist establishments in the development of health programs.

Industrial Indemnity
1471 Shoreline Drive
Boise, ID 83706

Industrial Medical Association
55 East Washington
Chicago, IL 60602

This association sponsors committees in areas such as industrial hygiene and clinical toxicology, radiation, and education and training.

International Safety Academy
10575 Katy Freeway
P. O. Box 19600
Houston, TX 77024
Phone: 713-932-9400

Safety management products for training in all areas.

Industrial Safety Equipment Association
60 Batterymarch Street
Boston, MA 02110

A clearinghouse on the subjects of fire prevention and protection.

Lab Safety Supply
P. O. Box 1368
Janesville, WI 53547-1368

Safety Equipment and Supplies Catalog.

Lederle Labs
2300 S. Eastern Avenue
Los Angeles, CA 90022

Mine Safety Appliances Company (MSA)
600 Penn Center Blvd.
Pittsburg, PA 15235
Phone: 412-273-5000

Protective equipment for handling hazardous materials.

Morrison-Knudsen Company, Inc.
One Morrison-Knudsen Plaza
Boise, ID 83702

3M Company
Visual Products Division
3M Center
St. Paul, MN 55101

National American Society Safety Engineering
1800 East Oakton Street
Des Plaines, IL 60018-2187

National Society for the Prevention of Blindness, Inc.
79 Madison Avenue
New York, NY 10016

Participates as a member of the American National Standards Institute in studies on illumination, vision, and eye protection.

NORCO
1121 S. Amity Road
Boise, ID 83702
Phone: 336-1643

Welding and safety supplies.

OSHA On-site Consultation Program
Community and Environmental Health
Boise State University
1901 University Drive
Boise, ID 38725

Safety program consultations.

Pharmaceutical Manufacturers
1144 15th Street, N.W.
Washington, DC 20005

(Rockwell Instructional Aids)
Delta Intarnational Machine Co.
Pittsburgh Corporation Office
246 Alpha Drive
Pittsburgh, PA 15238

Serina Press
70 Kennedy Street
Alexandria, VA 22305

Shell Chemical Company
50 West 50th Street
New York, NY 10020

Signal Press
1730 Chicago Avenue
Evanston, IL 60201

State Insurance Fund
Safety Standard Department
137 East 6th South
Salt Lake City, UT 84145=0420

Superintendent of Documents
Government Printing Office
Washington, DC 20402

Underwriters Laboratories, Inc.
207 East Ohio Street
Chicago, IL 60611

Maintains laboratories for the examination and testing of devices, materials and systems.

University of Idaho
Curriculum Dissemination Center
Division of Teacher Education
Moscow, ID 83843

Utah Society for Prevention of Blindness
2033 S. State, Building #4
Salt Lake City, UT 84115

U. S. Department of Labor
OSHA (Boise Area Office)
1315 West Idaho Street
Boise, ID 83702
Comm. Phone: 208-384-1867
FTS Phone: 554-1867

Vocational Agricultural Services
University of Illinois
434 Mumford Hall
Urbana, IL 61801

Zurich-American Insurance Company
Film Department
111 West Jackson Blvd.
Chicago, IL 60604